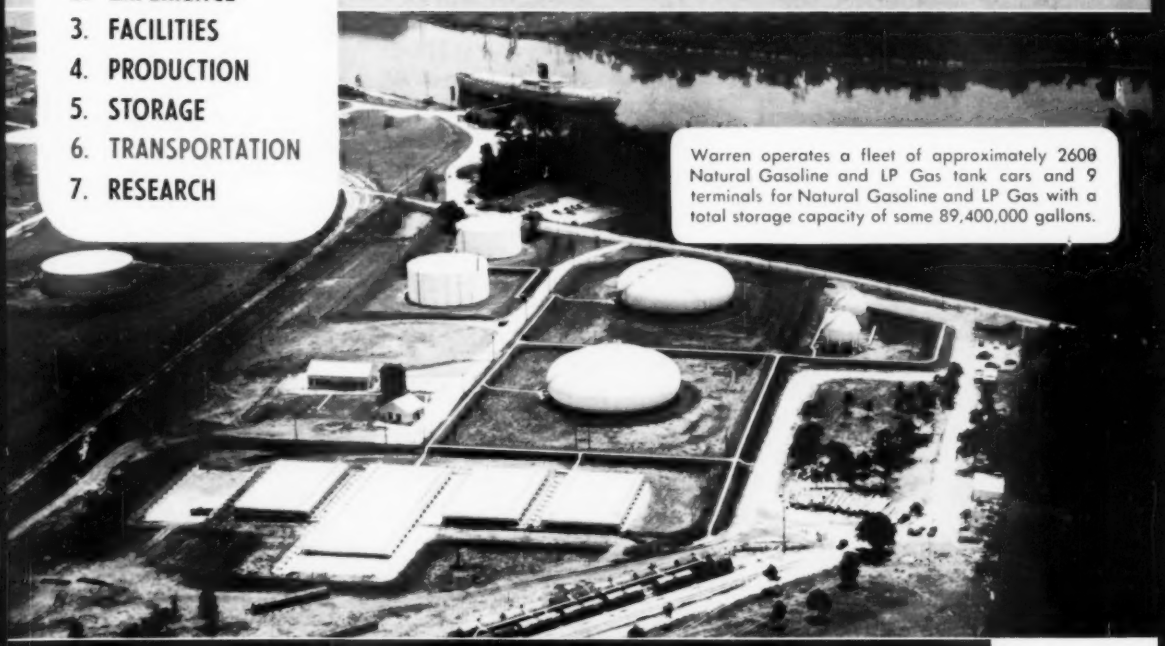
the OIL AND GAS JOURNAL

7 Reasons WHY IT'S WARREN

1. PERSONNEL
2. EXPERIENCE
3. FACILITIES
4. PRODUCTION
5. STORAGE
6. TRANSPORTATION
7. RESEARCH



Warren operates a fleet of approximately 2600 Natural Gasoline and LP Gas tank cars and 9 terminals for Natural Gasoline and LP Gas with a total storage capacity of some 89,400,000 gallons.

WARREN PETROLEUM CORPORATION

Producers, Manufacturers, Exporters and Marketers

Export Terminals: Corpus Christi, Port Arthur, Baytown, Texas City, and Norsworthy, Houston, Texas.

TULSA 2, OKLAHOMA CABLE ADDRESSES: Stavolene, Warren

WARREN'S NORSWORTHY, TEXAS TERMINAL

Crude Oil, Natural Gasoline and Liquefied Petroleum Products

PRICE 50 CENTS

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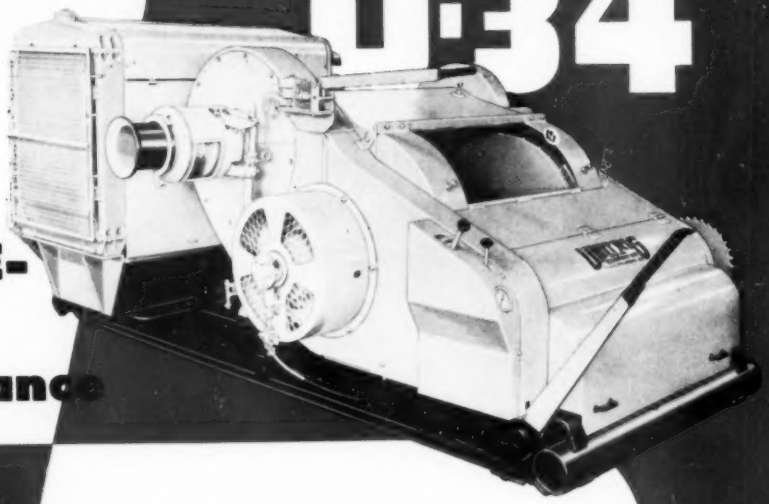
JUNE 16, 1949

U-34



SPEED plus TROUBLE-FREE Performance

for Shallow Well Drilling...

The U-34 design was made to include many features found in big, heavy-duty rigs. As much care, and engineering skill was used in perfecting the U-34 as is necessary for rigs capable of drilling to three times U-34's capacity. These "big rig" features have given the U-34 (at no extra cost) extra speed of operation plus time-saving trouble-free performance. That's why drillers have perfect confidence and assurance when they stand at the controls of a U-34. That's why drillers tell us they can do a better job faster and easier when they use a U-34 for drilling to 4,500 feet, or for well servicing.

Write for Bulletin...

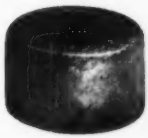
UNITRIG & EQUIPMENT CO.
TULSA, OKLAHOMA U.S.A.

DESIGNED FOR THE JOB...

Exclusive Export Representative
MID-CONTINENT SUPPLY CO.
42 Broadway, New York City
Cable Address: MIDUNITRIG

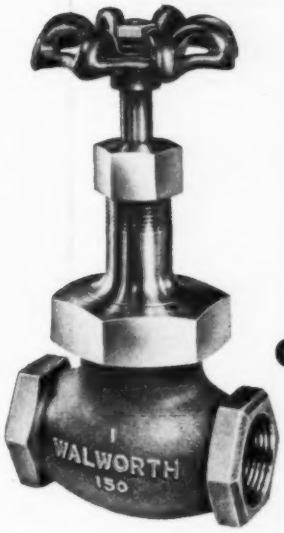
Toothed Lock Washer: Prevents loss of stem nut due to vibration, thereby holding the handwheel securely.

Newly Designed Handwheel: Air-cooled, finger grip handwheel affords sure grip even with greasy gloves.



Improved Packing: Molded packing of lubricated asbestos reinforced with copper wire. Suitable for practically every service. Valves can be repacked under pressure.

WALWORTH



IMPROVED

No. 95 BRONZE GLOBE VALVE

also available in Angle Type (No. 96)

The service ratings of the Walworth No. 95 are 150 pounds per square inch steam at 500F, and 300 pounds per square inch non-shock cold water, oil, and gas. In the manufacture of this quality bronze valve, more than 47 gages are used in machining parts to micrometric accuracy, thus insuring interchangeability of parts. For further information see your local Walworth distributor, or write: Walworth Company, 60 East 42nd St., New York 17, N. Y.

note these 7 Great Features

Hexagonal Union Bonnet Connection: Eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and assembled.

WALWORTH

valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.

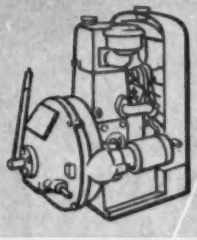
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

New Cylindrical Disc Holder: The design of the top portion of the disc holder keeps the disc accurately guided under all operating conditions.

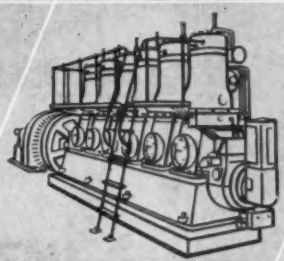
Renewable Asbestos Disc: This disc is suitable for steam up to 500F and is resistant to oil, gasoline, and many chemicals at atmospheric temperatures. Discs for special services are available.

Extra Strong Body: Made of Composition M (ASTM B61) bronze thick enough to provide a high safety factor. Valves undergo hydrostatic shell test of 450 psi.

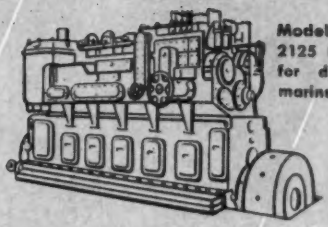
The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1949.



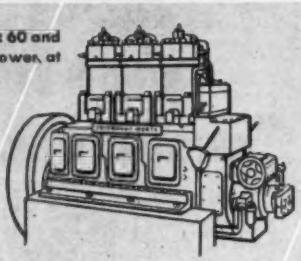
Model 45B: 5¼ horsepower engine for stationary and marine service.



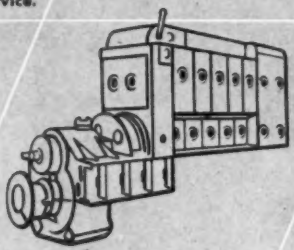
Model 32: Horsepower from 120 to 450. For slow-speed heavy-duty service.



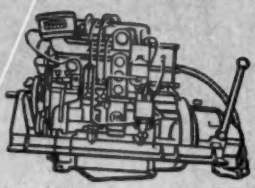
Model 37: 500 to 2125 horsepower for direct drive marine service.



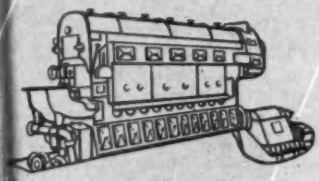
Model 42: 60 and 90 horsepower at 450 r.p.m.



Model 31: Horsepower from 175 to 500; with 2 to 1 reduction gears optional for marine service.

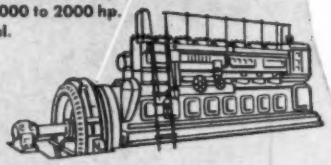


Model 48 Marine Engine: Also available for stationary or portable service. 3.5 to 80 hp.



Model 38 Opposed-Piston Engine: Horsepower from 960 to 1920 with 2 to 1 reduction gear for marine service.

Model 33 Stationary Engine: 500 to 2000 hp. Diesel, 1000 to 2000 hp. Dual Fuel.



When it comes to Diesel Power...

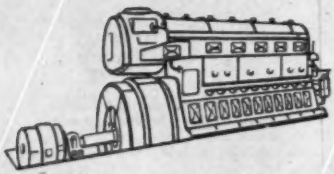
From 3.5 hp. to 3500 hp.

Low-cost, efficient power for all oil field services . . . modern, dependable power for drilling rigs, pumping stations, refineries . . . Fairbanks-Morse is the proved source for the full range of diesel applications. Many of the models illustrated here are available as dual-fuel diesels, an important oil field advantage. For skilled assistance and impartial recommendation for the diesel for your specific service, write Fairbanks, Morse & Co., Chicago 5, Ill.

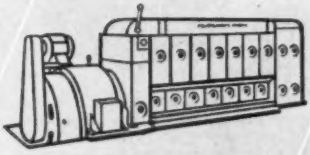
FAIRBANKS-MORSE

A name worth remembering

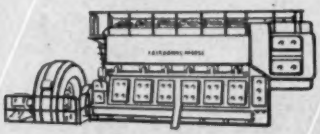
OIL FIELD EQUIPMENT • DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES • MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR CARS and STANDPIPES • FARM EQUIPMENT • MAGNETOS



Model 38 Opposed-Piston Engine: 960 to 1920 horsepower at 720 r.p.m.

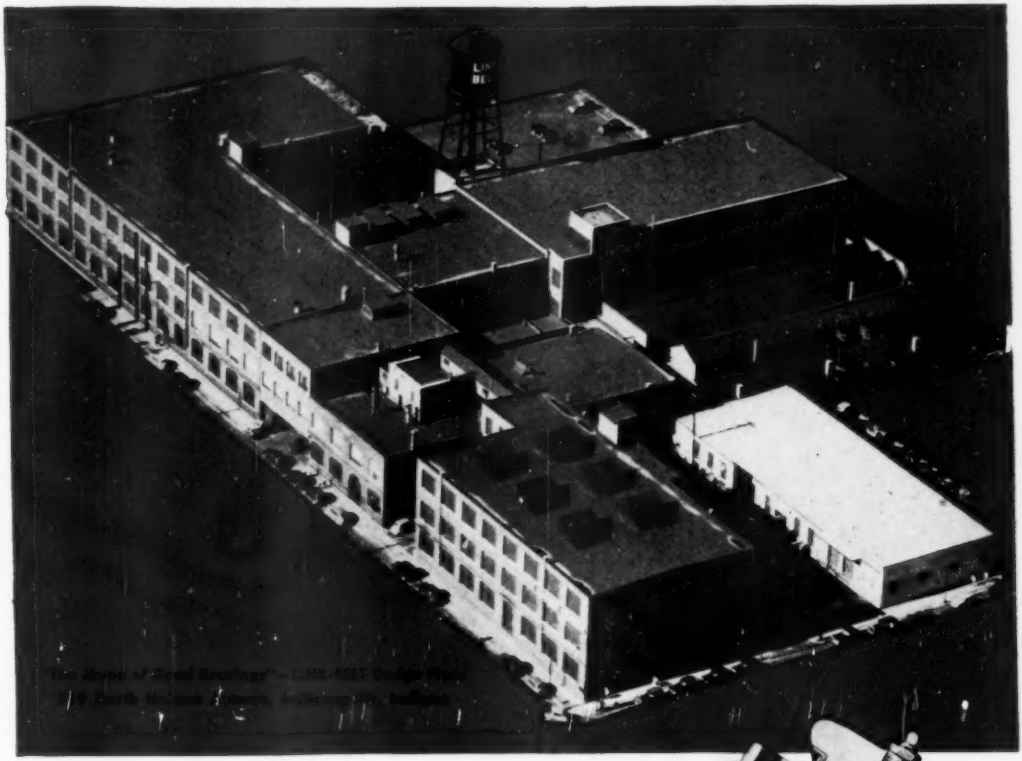


Model 31: Diesel generating set with kw. ratings from 118 to 360. Marine and stationary—Dual Fuel available in larger sizes.



Model 31: 2100 to 3500 horsepower diesel or dual fuel engine for heavy-duty stationary service.

One LINK-BELT Plant devoted *Solely* to bringing you better bearings—*Quickly*



Meeting industry's ever-increasing demands for ball and roller bearings that offer the desired combination of free-rolling action, self-alignment, and long life is no small-sized job.

That's why the entire capacity of Link-Belt's Dodge Plant in Indianapolis is devoted to this important task.

From the receipt of housing castings furnished by sister plant foundries to shipment of finished mounted bearings, alert design engineers, skilled craftsmen and the most modern bearing production machinery work hand-in-hand to turn out the bearings that enable users to TURN SHAFTS EFFICIENTLY.

Cut-away view of Series 200 Ball Bearing Pillow Block

LINK-BELT COMPANY

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11,387

LINK-BELT

Ball and Roller BEARINGS

AMERICAN Pumping Units

• • • Hold Pumping Costs Down

You can choose from many different combinations of structure and reducer sizes of American Units. This wide range of sizes makes it possible to get an American Unit for the most efficient service on your wells.

Every American Pumping Unit, from the husky little T-5 to the big, powerful T-27, is designed to A.P.I. standards.

For longer service with less servicing, and a bigger return on your pumper investment, specify AMERICAN... proven by 25 years of service to the oil industry.

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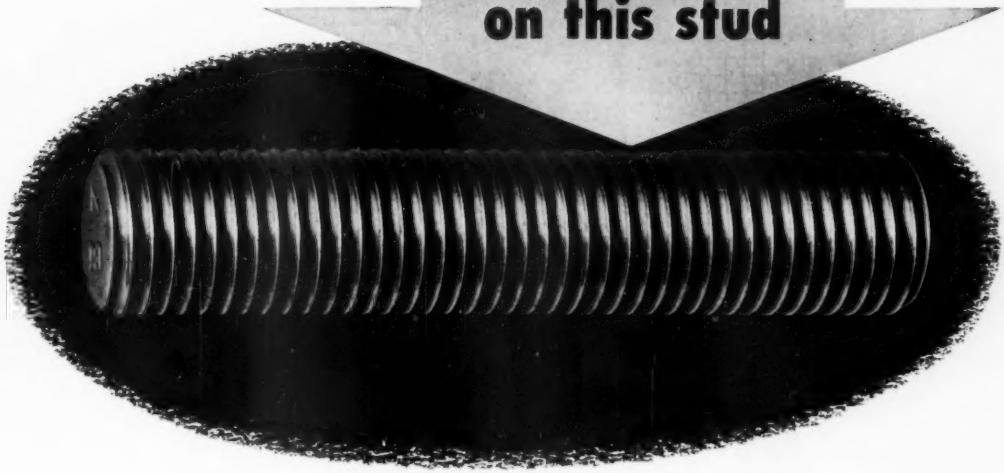
FORT WORTH, TEXAS PHONE 8-2301

Stress concentrations can't gang up on this stud



All too frequently stress-concentrations have been the cause of stud failure in the high-temperature bolting jobs encountered in refineries. But with the Bethlehem continuous-thread stud shown here, failure is practically unheard of, regardless of high temperatures or high pressures.

The Bethlehem continuous-thread stud resists stress-concentrations because it has no point of thread run-out. Those stresses which do occur are effectively distributed over the entire length of the stud, thus enabling it to provide economical performance for long periods of time.

The Bethlehem continuous-thread stud is made from carbon or alloy steels, and comes either plain or heat-treated. It is furnished in a complete range of diameters and in any length, with most sizes carried in stock.

Bethlehem also manufactures the continuous-thread tap-end stud for installations requiring but one nut. This stud has its chamfered tap-end threaded to Class 5 fit, and its rounded nut-end threaded to either Class 2, 3 or 7 fit, yet the blending of threads is accomplished so skillfully that the point of change is undetectable.

Complete details? We'll be glad to send them to you. All you need do is get in touch with the nearest Bethlehem sales office, or drop a line to us at Bethlehem, Pa.

CONTINUOUS-THREAD STUDS ARE A PRODUCT OF BETHLEHEM'S LEBANON, PA., PLANT

BETHLEHEM STEEL

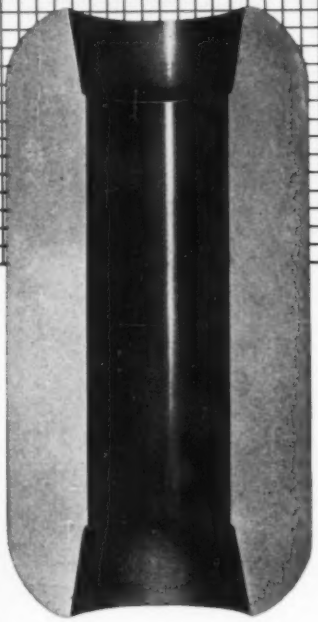
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

Bethlehem supplies every type of Fastening

Cross Section of Quality

or why Patterson-Ballagh Casing Protectors last longer



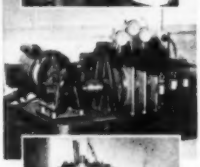
These tapered recesses allow less stretching at the ends, keeping stress here less than in thick body when Protector is installed, thus eliminating tearing at this vulnerable point.

Quality Protectors come from quality workmanship in the shop and laboratory. This new shock-proof, tear-resistant Casing Protector represents endless hours of testing in both laboratory and field. Now it is *field proven* and ready for your drill pipe.

This new design meets the rough use and abuse of deep drilling. Engineers know that rubber under less stress will withstand more shock and tearing action than highly stressed rubber. Since the ends of a protector take the greatest beating down the hole, the tapered ends of the new Patterson-Ballagh Protector are not stressed as highly as the body, yet they grip the drill pipe firmly and prevent any fluid from getting between the rubber and drill pipe. These resilient ends allow the Protector to absorb shock and resist tearing action at this point.

To further insure proper rubber stress, *every Protector is designed for one, and only one, size drill pipe.* Call your Patterson-Ballagh man and have a new Protector installed on every length of drill pipe.

Tensile testing machine tests rubber samples from each batch of rubber to insure quality control.



This machine tests the abrasion-resistance of rubber samples—another example of why we know our Protectors will give long wear.

Rubber samples are aged, equivalent to two years, in a few hours time in high pressure oxygen ageing equipment.

The resistance of rubber under tension to hot oil is determined in this bath that simulates actual operating conditions.

PATTERSON BALLAGH · SEAL OF QUALITY · OIL FIELD SPECIALTIES

Specify

PATTERSON-BALLAGH

DIVISION OF BYRON JACKSON CO

22 Years of Service to the Oil Industry

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NBT *is in step with the* OIL INDUSTRY

The officers of this bank have been in close contact with the oil industry for years . . . they KNOW the problems of Exploration, Drilling, Contracting, Producing, Refining, Marketing, Equipment Manufacturing and the Supply business, and are in a position to give you sound counsel concerning your present and future financial needs.

Friendly, courteous, personal service awaits you at "The Oil Bank of America."

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YOU CAN BE **SURE**.. IF IT'S

Westinghouse

—*and*

NOW...

Needs No Lubrication

Now . . . for the first time . . . you can install electric motors, or motor-driven equipment . . . and forget motor lubrication.

Westinghouse Life-Line . . . industry's amazing, new, all-steel motor . . . now completely eliminates one of the biggest elements in the maintenance of motors . . . periodic motor lubrication. Life-Line motors are equipped with sealed bearings, pre-lubricated with a more-than-ample supply of specially-treated lubricant.

Correct lubrication and long life are assured . . . motors may be placed on pumping jobs in remote locations without need for further lubrication attention.

Added to Life-Line's plate-steel protection, improved windings and more compact size, *pre-lubrication* is one more important reason for converting to Life-Line power. Standard ratings available from stock—others on short delivery. Ask for prices and delivery on your requirements. Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-21527-B

"OILWELL" can supply any subsurface pump to meet your well requirements

"OILWELL" subsurface pumps and pump parts are manufactured in the widest selection of materials, types and sizes. Because of "Oilwell's" automatic machines and ultra-critical gauging practices each part receives uniformly high-precision workmanship.

As an example—on all plunger pumps, the plungers are so carefully ground and the barrels honed and gauged to such close tolerances that uniform fit between barrels and plungers is assured . . . a "plus value" you always get from "Oilwell".

Competent "Oilwell" representatives are available for consultation and to recommend the various combinations of pump parts so as to meet any of the multitude of well pumping problems encountered.

"Oilwell" Silverline Stationary Full Barrel Rod Pump with Regular Bottom Seating Body.

In the pages of "Oilwell's" New Subsurface Pump Catalog

. . . you will find the parts to make up any pump assembly required to meet your own individual pumping conditions.

Write for your copy . . . TODAY

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Branches Serving All Oil Fields

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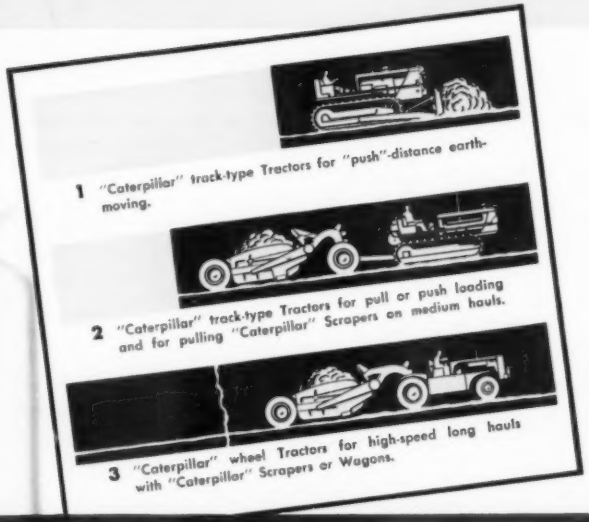
USS "OILWELL"

UNITED STATES STEEL

Only "Caterpillar" makes earthmoving equipment for all zones of operation



1 "Caterpillar" track-type Tractors for "push"-distance earth-moving.

2 "Caterpillar" track-type Tractors for pull or push loading and for pulling "Caterpillar" Scrapers on medium hauls.

3 "Caterpillar" wheel Tractors for high-speed long hauls with "Caterpillar" Scrapers or Wagons.

Whether you own and operate it yourself or "hire" it through a contractor, you're money ahead on every job when your earthmoving equipment is *all*-"Caterpillar"—

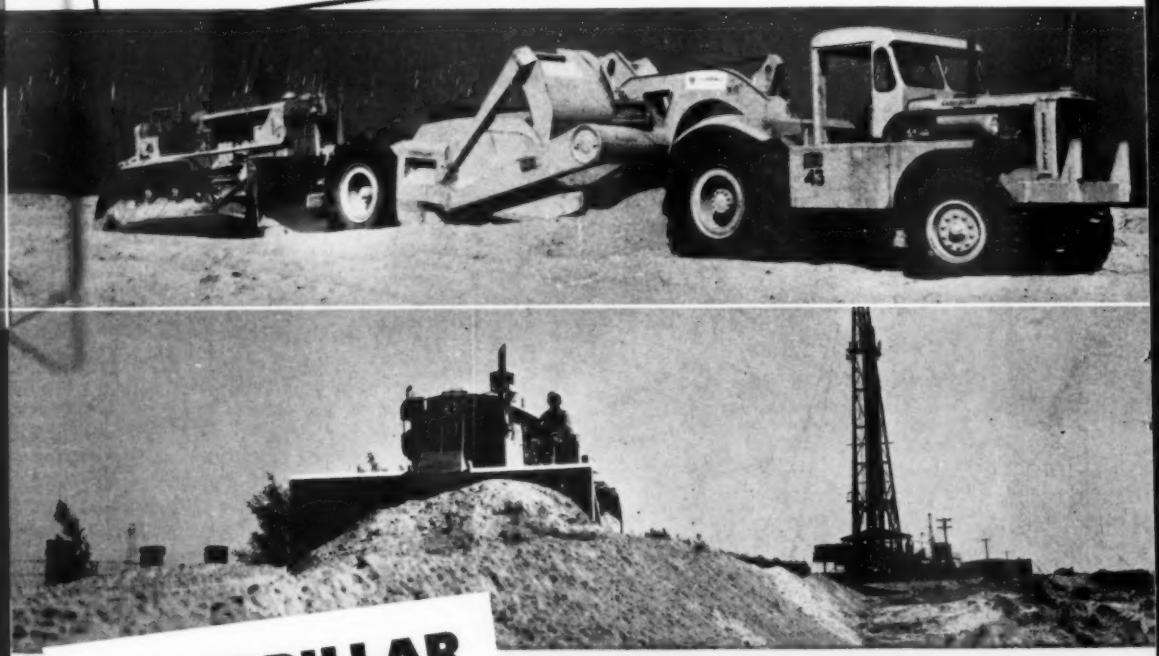
— Because "Caterpillar" Diesel Tractors (track-type and wheel), Scrapers, Wagons and Bulldozers are designed, built and matched to work together — thus handling each phase of the job with highest efficiency and utmost time saving;

— Because operators become more expert — accomplish more — when they have only one line of equipment with which to become familiar;

— Because parts and service facilities are available through one manufacturer and one dealer organization — thus simplifying maintenance and avoiding delays, mix-ups and excessive down time.

Standardize and economize with "Caterpillar" equipment!

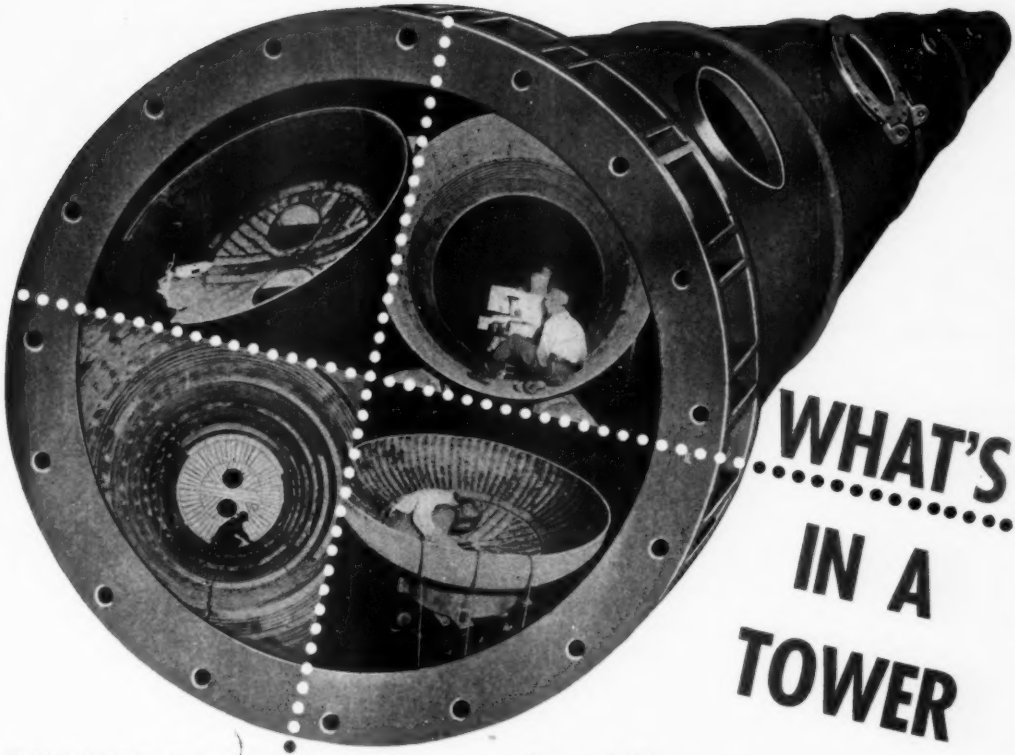
CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS



CATERPILLAR
REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

Building California derrick site and access road with all-"Caterpillar" equipment. Project includes moving sandy river-bottom material for raising derrick site above flood level and for building ¼-mile access road. *Top*—A fast-stepping "Caterpillar" DW10 Tractor and No. 10 Scraper haul 10 pay-yards after a "Caterpillar" D8 Tractor push-loads the unit in less than a minute. *Bottom*—The D8 with "Caterpillar" No. 8S Bulldozer shaping fill area of haul road. Contractor: T. H. Walsh Argo Engineering Co. Customer: Standard Oil Co. of California.



WHAT'S IN A TOWER

Fluid catalytic unit tower 8'0" ID x 50'0" 5/8" steel shell, clad with 12 gauge stainless steel strips, complete with tray supports...Nooter fabricated to Universal Oil Products Co. design.

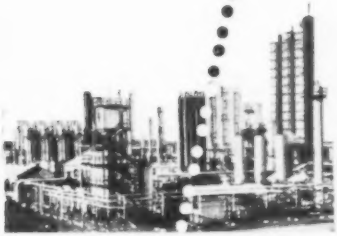
besides design and metal?

Well, for one thing: Over one mile of Nooter *DuraPure* Welding. The continuous automatic and manual arc-welded construction surpasses API-ASME Code specifications. . . Uniform bond achieves high strength, and surface purity of welds maintains corrosion-resistance. Stress-relieving insures safety and precise, undistorted alignment.

After being cross-checked for precision fit-up the vessel was shipped on schedule — ready for erection.

This is why Nooter-fabricated equipment is competently serving the petroleum industry throughout the world.

When your blue prints are ready — call in Nooter!



NOOTER

Nooter Catalog, complete with corrosion data charts is sent at your request.

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Positive Eye Protection . . .

AO F 9200 351A Goggles

AO F-9200 ACETATE SPECTACLE GOGGLE

Very popular because of its lightweight comfort and good looks, the F-9200 of transparent, non-flammable *cellulose* acetate protects against particles striking from the front—and is available with acetate side shields when needed. End pieces are set high—out of the line of sight for unobstructed vision. Side shields are perforated for ample ventilation and fog retardance of lenses.

Other Features: Comfortable nose pads which evenly spread goggle weight . . . light but sturdy keyhole bridge . . . 6 Curve Super Armorplate orbit-shaped lenses for maximum protection and visibility. Clear or Calobar. Medium, dark or extra dark lens shades.

For Refinery Work

AO 351A AIR CONDITIONED GOGGLE

Oil producers, drillers, well diggers, maintenance men on refinery stills and others who work in hot and humid atmospheres or cramped quarters like the ample ventilation of the 351A. Extension rings supply nearly double the usual air flow and prevent fogging, while protecting against particles striking from any direction.

Individual eyecups are shaped to eye contour, fit snugly and are low set for wide-angle vision.

Other Features: Insulated ball-chain bridge—easily adjusted . . . one-piece, quickly adjustable, rubber headband . . . 50 mm (regular or 6 curve) Super Armorplate clear or Calobar lenses in medium, dark or extra dark shades.

For Field Work

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Safety Products Division

Southbridge, Massachusetts • Branches in Principal Cities

When burning coke from header boxes and plugs, using pneumatic tools for turbining tubes, rolling tubes and heading up—for many jobs which require eye protection, AO Safety Goggles provide the maximum in safety and comfort. Order from your nearest AO Safety Products Representative.

THE *New* HUDSON
Performance COOLING TOWERS

- **IMPROVED AIR FLOW AND AIR-WATER CONTACT**
- **ECONOMY IN FABRICATION AND ERECTION**
- **LOWER OPERATING COST**
- **GREATER STRUCTURAL STRENGTH**

ENGINEERS *CONSTRUCTORS*

HUDSON ENGINEERING CORPORATION

FAIRVIEW STATION HOUSTON, TEXAS

NOW...

BREWSTER'S SERVICE DEPARTMENT

. . . is available—day or night—to repair BREWSTER rigs anywhere in the United States, or ANY rig located in the Mid-Continent Area.

TEAR OUT the Card below and KEEP IT HANDY!

Completely equipped and manned by trained, experienced personnel, the Brewster Service Department is devoted exclusively to field service and repair of Brewster rigs anywhere in the U. S., or any make drilling rig in the Mid-Continent Area. When breakdowns or accidents shut down your operations, call the Brewster Service Department for replacement parts and fast, expert repair service. Night or day, a Brewster Service Man will be on his way to your drilling location by truck—or by air if necessary! A folder is available describing the facilities of the new Brewster Service Department—write for your copy today.

The BREWSTER COMPANY, Inc.
SHREVEPORT, LOUISIANA

For BREWSTER SERVICE

CALL SHREVEPORT, LOUISIANA

DAY PHONE: 4-3255

NIGHT PHONE: 7-3461

ALTERNATE PHONE: 7-1902

BREWSTER
MATCHED
Drilling Equipment

Every part corrosion-resistant to save you money! This fully-exploded view shows how the Ampco Pump is designed and constructed. Grades of Ampco alloys (aluminum bronze) selected for each part are varied to insure maximum life and best performance. All sizes are available in pedestal or close-coupled types.

Ampco Pumps give maximum efficiency plus 5 extra features . . . at no extra cost!

Ampco Pumps resist corrosion, erosion and cavitation without loss of efficiency.

Ampco Pumps are designed for high efficiency — *and maintain it* because they are made of correctly mated Ampco alloys. These alloys hold wear to an absolute minimum; they have a natural resistance to the destructive action of corrosion, erosion, and cavitation.

Here are five "plus" features usually found only in special pumps. They add $50.00 or more to the price you pay (when you can get them) — and lengthen delivery by weeks. Yet you get them in the rugged Ampco Pump — all for a *standard* pump price.

1. *Corrosion-resistant impeller and casing* — made of Ampco (aluminum bronze) alloy with an average tensile strength of 75,000 p.s.i., Brinell 125 (3000 kg.).

2. *Corrosion-resistant shaft* — made of Ampco (aluminum bronze) alloy with a fatigue life of 100,000,000 cycles at 37,000 p.s.i., yield 65,000 p.s.i., elongation 17% in 2".

3. *Hard, corrosion-resistant sleeve* (with special, selected packing) — made of Ampco (aluminum bronze) alloy with an average tensile of 85,000 p.s.i., Brinell 331 (3000 kg.).

4. *Wear and corrosion-resistant wearing rings* — made of Ampco (aluminum bronze) alloy properly mated with impeller to insure maximum wear and corrosion-resistance having yield strength of 38,000 p.s.i. and 20% elongation in 2".

5. *Frame or adapter* made of Ampco (aluminum bronze) alloy to insure complete corrosion-resistance of the entire unit.

Save—both on initial cost and replacement costs. Insist on Ampco Pumps. Tested and approved in petroleum, chemical and food processing industries, and in breweries. Get complete information.

AMPCO®

Ampco Metal, Inc. Milwaukee 4, Wisconsin

West of the Rockies, it's the Ampco West Coast Plant, Burbank, California

Special Pumps — pictured above are twin Ampco centrifugal pumps powered by a gasoline engine mounted on Ampco fabricated skids — for oil-field service.

Let us help you with your special pump problems.

FREE Bulletin on Ampco Centrifugal Pumps. Tear out this coupon and mail today.

Ampco Metal, Inc. Dept. OG-6, Milwaukee 4, Wisconsin

Send me Bulletin 85 on Ampco Centrifugal Pumps

Name..... Position.....

Company.....

Street Address.....

City..... ( ) State.....

FIELD PROVED

Unique 9 Part Fabric

Its patented construction is entirely unlike any other. Scores of wires are stranded in 9 parts, then into three parts.

Interlaced By Machine

On special precision machines, originated by Union Wire Rope engineers, three three-strand parts are so interlaced as to form a sling fabric so much stronger, with so much tougher wearing qualities and with so much more flexibility that you just have to see how much longer service it gives to believe it.

Constructed To Prevent Rotating of Load

The inequalities of hand made slings are eliminated. The parts of Tuffy Sling fabric are so uniquely interlaced that they neutralize the load torque which causes rotating of the load on straight pulls.

Tested Strength Is Twice Safe Working Load Limits

Metal tags on Tuffy Slings give their safe working load. Each sling or leg of a bridal sling is proof-tested to twice this safe working load.

95% of Fabric Strength Is Developed In the Eye Splices

Here the unique interlacing of Tuffy scores again. It permits ready forming of eye splices possessing 95% of the strength of the sling fabric.

PATENT NO. 2,454,417

UNION WIRE ROPE CORP

UNIO

Wire Ro

Super
TOUGH

Ultra
FLEXIBLE

REG. TRADE MARK

Tuffy Slings

Working any sling under load with knots or kinks in it is not recommended. But, sometimes it's unavoidable. Then is when the ultra-flexibility of Tuffy Slings stand you in good stead. Tuffy can take more of such punishment longer and you can straighten them out more often without material damage. The same is true of flattened eyes and because of the unique interlaced fabric construction, cutting of any one of the 9 strands will not result in stranding of the sling.

For a long time now, Tuffy Slings have proved they have the extra strength and ultra-flexibility to stand up during longer service on any kind of a load, under any kind of pull and with every type of hitch.

Try any one of the 9 factory packaged sizes. Prove their money-in-your-pocket worth to you to your own satisfaction.

Tuffy Sling Fabric also Available for Eye Splicing in Your Own Rigging Loft

If you are rigged for eye splicing your own slings, Tuffy Sling fabric is available on the reel. Your riggers will like the ease and speed of splicing that Tuffy interlaced construction affords.

UNION WIRE ROPE CORPORATION

2102 MANCHESTER AVE. KANSAS CITY 3, MO.

☐ **Send Facts on Tuffy Slings Including Safe Working Loads of 9 Sizes Which You Deliver as Complete Packages.**

For Tuffy Slings—See Your Union Wire Rope Distributor (Listed in Yellow Section of Your Telephone Directory) and/or Send This Coupon.

FIRM NAME _____

BY _____ **TITLE** _____

ADDRESS _____

CITY _____ **ZONE** _____

STATE _____

Baroid

Non-Caking Organic Mud Thinners...

CARBONOX

TANNEX

CARBONOX, Baroid's new organic mud thinner, provides an excellent means of thinning and reducing the gel strength of drilling muds. It may be used for the same purposes for which quebracho is used. Many operators use it successfully to treat normal *p*H muds, high *p*H Impermex muds, and high *p*H lime muds. CARBONOX requires less caustic soda than does quebracho to treat normal *p*H muds, the usual treatment being made in the proportion of 10 pounds of caustic soda to 50 pounds of CARBONOX. Muds treated with CARBONOX offer unusual resistance to contamination by salt water.

TANNEX is a full substitute for quebracho. It can be used wherever quebracho is used, and in exactly the same manner. Both compounds show continued mud thinning efficiency even when exposed to high bottom-hole temperatures. Neither of these powders, unlike quebracho, has any appreciable tendency to lump, cake, or turn hard, nor will spoilage occur in storage.

Baroid Sales Division, Department A-8
P.O. Box 2258, Terminal Annex, Los Angeles 54, Calif.

Send me detailed information on CARBONOX and TANNEX organic mud thinners.

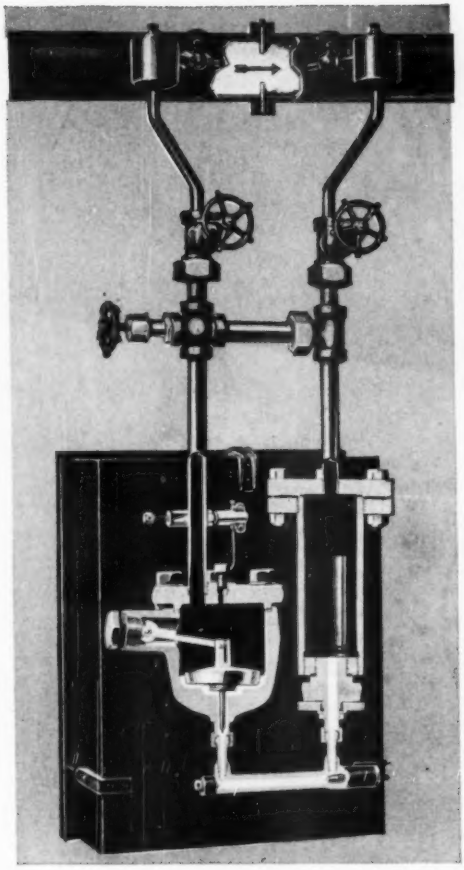
NAME

COMPANY TITLE

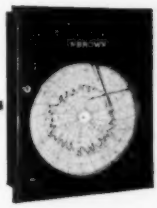
STREET

CITY STATE

BAROID SALES DIVISION
NATIONAL LEAD COMPANY
LOS ANGELES 12 • TULSA 3 • HOUSTON 2



THIS FLOW METER DOES IT



gives you the benefits of Proved Performance with Easier Maintenance and Lower Upkeep

YES *proved performance through continuous acceptance for years in thousands of installations.*

YES *easier maintenance because it is easily cleaned and calibrated.*

YES *lower upkeep costs because control units and other components are the same as those used in Brown Pressure Gauges, Thermometers and ElectroniK Potentiometers.*

With this Brown Mechanical Flow Meter, control may be obtained through any of four pneumatically operated systems . . . control as precise and accurate as your process justifies.

Maintenance is minimized . . . range tubes are easily changed and can be cleaned in a matter of minutes.

For accurate flow measurement and control, and ease of maintenance and operation . . . you can rely on the Brown Mechanical Flow Meter. Call in your local Brown engineer for free consultation and advice . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO.
BROWN INSTRUMENTS DIVISION
4488 Wayne Ave., Philadelphia 44, Pa.
Offices in principal cities of the United States, Canada and throughout the world

MINNEAPOLIS Honeywell *Advanced Instrumentation* FOR THE PETROLEUM INDUSTRY BROWN INSTRUMENTS

NEW AMERICAN IRON TYPE GM CONTROL HEAD PACKER WITH DOVETAIL SLIPS

- Specially engineered dovetail slips and guides!
- Patented lateral expanding cup assembly (sealing element)!
- All the seal is accomplished in one sealing element!
- Patented simple-setting arrangement!
- Full tubing size opening through length of packer!
- Smooth running because of ample fluid by-pass area!
- Choice of large, carefully heat-treated friction springs or friction block assembly!

FOR DEEP HOLES . . . HIGH PRESSURES

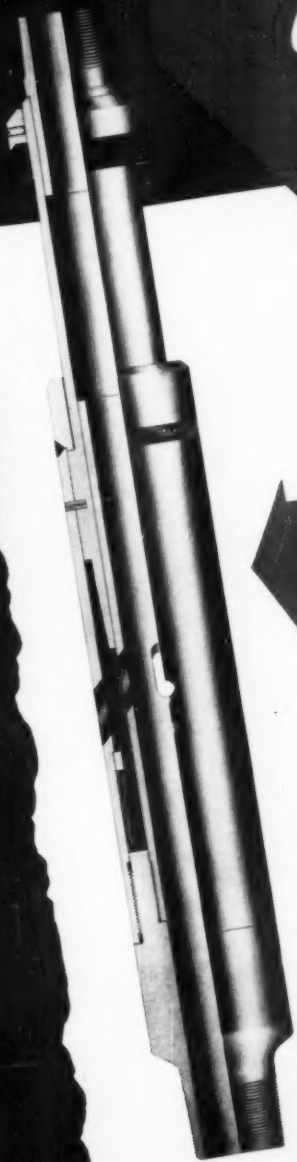
This Type GM American Iron Control Head Packer has ALL the field-tested features of our popular Type G Control Head Packer PLUS such additional features as Dovetail Slips! It is available with friction block assembly instead of friction springs, if desired. In every way, this packer is engineered for extra heavy-duty performance requirements encountered in areas where extremely difficult conditions exist. Just like our Type G Packer, this Type GM Packer seals without crushing the cup because the super cup assembly is expanded laterally—not compressed! And the complete seal is accomplished with this one sealing element which results in a large, perfectly sealed area that withstands highest pressures encountered.

AMERICAN IRON & MACHINE WORKS CO.
Oklahoma City, Oklahoma—Box 1177
Phone L. D. 518—District Office:
Houston, Texas—Export Office:
11 West 42nd St., New York City, N. Y.

AMERICAN IRON & MACHINE WORKS CO. A OKLAHOMA CITY U.S.A.

REMEMBER, THERE IS AN AMERICAN IRON SERVICE MAN IN EVERY ACTIVE FIELD

NEW AMERICAN IRON CIRCULATING JOINT



Designed with four jet action ports directed 45° downward

- Has single element positive seal
- The port area exceeds the tubing volume
- Non-rotating to open or close
- All mechanism is fully enclosed
- Constructed of trouble-free, heavy duty parts

OPERATION EASY . . . SIMPLE!

This American Iron Circulating Joint is designed for use with our line of control head packers but it may also be used for numerous operations requiring circulation or by-pass between tubing and casing. When this circulating joint is used in its normal position on top of the packer with ports directed downwards, it is a great aid for washing settlings, etc., from the top of the packer and also for reconditioning the mud above.

In running position this circulating joint is held open by two shear pins of 6,000 lbs. total value. After packer is set in the normal manner simply add sufficient additional weight to shear pins which close valve. To open, raise tubing about 5 inches at the circulating joint.

AMERICAN IRON & MACHINE WORKS CO.
Oklahoma City, Oklahoma—Box 1177
Phone L. D. 518—District Office:
Houston, Texas—Export Office:
11 West 42nd St., New York City, N. Y.

AMERICAN IRON & MACHINE WORKS CO. · OKLAHOMA CITY U.S.A. ·

REMEMBER, THERE IS AN AMERICAN IRON SERVICE MAN IN EVERY ACTIVE FIELD

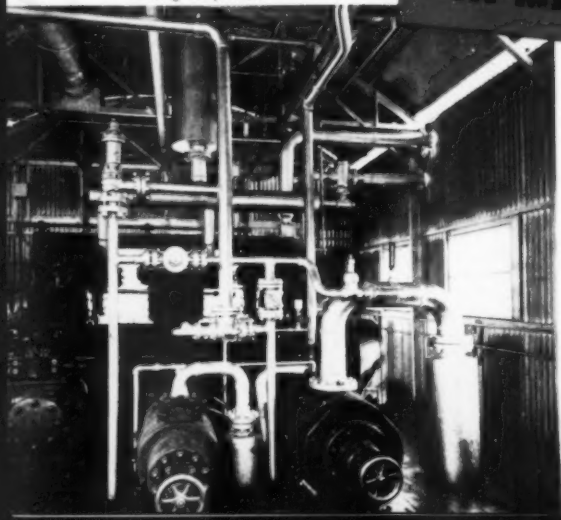
ANOTHER NOTABLE "FIRST" BY

Levingston

COMPRESSOR BARGES FOR GAS CYCLING OR TRANSMISSION IN MARINE FIELDS

Above—Compressor Barge being towed to location.

Below—Interior view of Barge showing compressor.



Here is another example of Levingston's leadership in the field of specialized marine equipment for the petroleum industry.

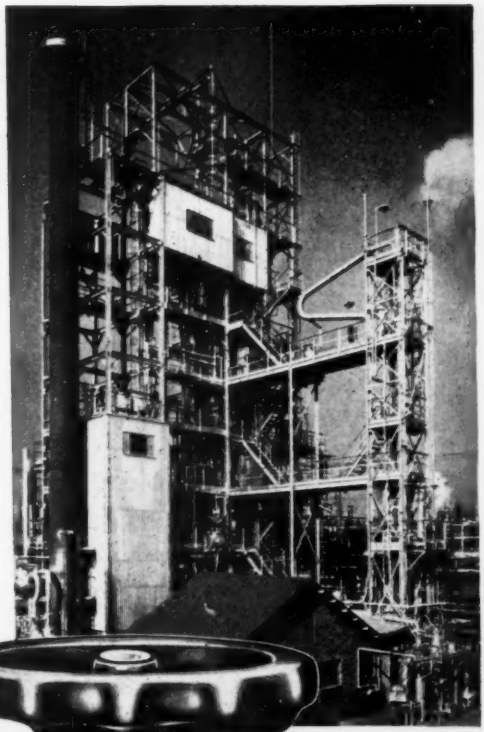
Levingston

SHIPBUILDING COMPANY

ORANGE, TEXAS

In Laboratories and in Gas Synthesis Plants

EACH day more of the major projects in the petroleum industry prove that OIC *sets the pace in valves!* Included in recent large-scale installations is one of the industry's leading research laboratories that deserves the highest commendation for its contributions to synthetic rubber and other developments. Part of this operation is this twelve-story Gas Synthesis pilot plant, designed to play a vital part in the research and development of synthetic gasoline.

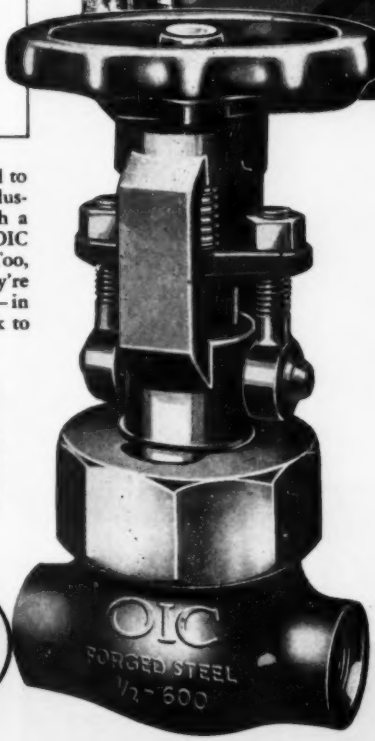


OIC
SETS THE PACE IN VALVES

Yes, OIC Valves are *precision* valves, designed to meet every requirement of the petroleum industry. Streamlined for free and easy flow with a minimum of pressure-cutting turbulence, OIC Valves keep pressures *up* and costs *down*. Too, there's an extra margin of safety, for they're built to provide maintenance-free service—in heaviest use. And for leakproof closures, look to OIC . . . Pace-Setter in Valves!

NEW OIC FORGED STEEL VALVE CATALOG NO. 48FS NOW READY

It's made to fit inside your big 235-page OIC Catalog. You'll have *all* the valve information you need right at your fingertips. For your free copy, just write, giving your name, firm and address to The Ohio Injector Company, Wadsworth, Ohio.



OIC
VALVES

IRON • STEEL • BRONZE

Applying foresight to problems of engine operation

Ethyl predicts the performance of fuels and lubricants used in engines operating in field service. This foresight is the foundation of Ethyl's "preventive service" designed to help refiners meet, with a minimum number of fuels and crankcase lubricants, the continually expanding use of gasoline engines, under a wider range of operating conditions.

Ethyl's "preventive service" is aimed at avoiding difficulties which might otherwise arise in the use of petroleum products. Frequently, before experimental engines are put into production, the Laboratories subject them to exhaustive tests. If any incompatibility with petroleum products appears, modifications are made until successful results are achieved. Information so obtained is passed along to the engine manufacturers. All the wide variety of Ethyl's varied research facilities, including a cold room (left), are available for such work.

As a result of experience gained over more than 26 years, Ethyl Laboratories are able to evaluate the properties of petroleum products in respect to the results they may be expected to give in the wide variety of gasoline engines now in production. The performance of many types of gasolines and lubricating oils, under a wide range of conditions, is continuously observed in research projects at the laboratories. If any incompatibility of these products with engines in production is noticed, the results are passed along to the oil companies.

Many members of the Ethyl Laboratories are authorities on engine-fuel relationships and are always available to engineers of automotive companies for consultation in connection with research programs conducted in their own laboratories. Likewise, Ethyl technologists are glad to discuss with technical people of oil companies the performance of their products as revealed in research programs and in field service.

Occasionally operating problems develop in the field because of abnormal conditions which could not be anticipated during the design of the engines. When this happens, the Ethyl Laboratories, having the benefit of specific information supplied by its field organization, work closely with the oil and automotive companies concerned.

A further extension of Ethyl's work in the field is the maintenance of contact with the operators of truck, bus and passenger car fleets. Based on field observations and on special research work conducted in the Ethyl Laboratories, recommendations are made to engine users to assist them in obtaining the best engine performance and durability on the fuels and crankcase lubricants used.

Ethyl's field and laboratory consulting service is part of the comprehensive Ethyl program aimed at:

1. Providing antiknock compounds of the highest quality.
2. Assisting refiners to use "Ethyl" antiknock compounds most effectively.
3. Helping the makers and users of gasoline engines to get the greatest benefit from gasoline improved with "Ethyl" antiknock compound.
4. Assisting refiners in their future plans by anticipating developments in automotive power plants and fuels.

This message is the fifteenth in a series dealing with problems faced by refiners in producing gasoline for today's and tomorrow's engines, and the contribution of the Ethyl Corporation to their solution. Future messages will discuss other phases of these complex problems.

SINCE 1923 — *Continuous Research to Provide Better Antiknock Service*

ETHYL CORPORATION

RESEARCH LABORATORIES

DETROIT, MICHIGAN . . . 1600 WEST EIGHT MILE ROAD

SAN BERNARDINO, CALIFORNIA . . . 2600 CAJON ROAD

BY INDUSTRY-WIDE REQUEST

FAMOUS "BCF" ALL-PURPOSE EXCHANGERS NOW PRODUCED IN

All-Stainless Steel

At low unit cost!

Your industry asked for it. So here it is ...the first fully standardized, all-stainless steel shell and tube exchanger... identical in design and dimensions to its cuprous counterpart, the world-famed "BCF" ...and like it, mass produced!

DESIGNATED TYPE "SSCF," this addition to the Ross line will prove particularly valuable to you as a low cost, immediately available, stainless steel exchanger for service where oils or other fluids may be contaminated by other metals.

As an original equipment manufacturer furnishing exchangers as part of your package, as an equipment user, or as a processor, you will be interested in the cost-saving and time-saving advantages resulting from Ross' full standardization and mass production of this new Type "SSCF" Stainless Steel Exchanger.

NEW BULLETIN Become familiar immediately with the new "SSCF." Write for Bulletin 1.7K1. Complete design details and sizes.

ROSS

ROSS HEATER & MFG. CO., INC.

Division of American Radiator & Standard Sanitary Corporation

1417 WEST AVENUE, BUFFALO 14, N. Y.

Represented in Canada by Horton Steel Works, Ltd., Fort Erie, Ont.

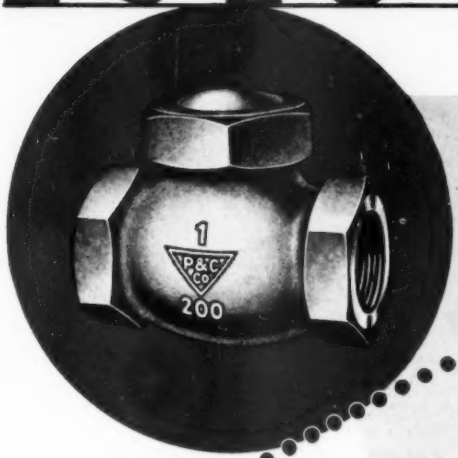
Serving home and industry

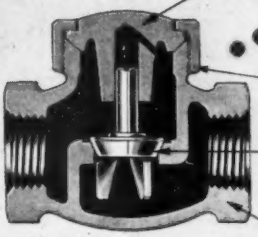
AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILER • ROSS HEATER • TONAWANDA IRON

R·P&C

BRONZE LIFT CHECK VALVES

designed and built to take ***PUNISHMENT***





1 **CAP**—forms an efficient beveled joint with the body. The integral disc guide has long contact with the disc stem for perfect alignment and resulting free movement and positive seating. It also cushions disc movement.

2 **UNION NUT**—heavy and rugged. Can be removed and replaced without danger of distorting the body or weakening threads.

3 **DISC**—well guided with just the right seating angle for positive closure without sticking. Seating surfaces regrindable.

4 **BODY**—has heavy section at cap joint and end hex with long contact end threads. Seat is integral with body.

THESE BRONZE LIFT CHECKS—rated 200 pounds and 300 pounds—are especially suited to prevent back-flow on high velocity line or where flow is pulsating. Shut-off is quick, positive and tight. For use in horizontal lines only. • (On low or moderate velocity lines, R-P&C swing checks are recommended.) • Get in touch with the nearest R-P&C District Office or R-P&C Distributor for information about Check Valves.

ACCO

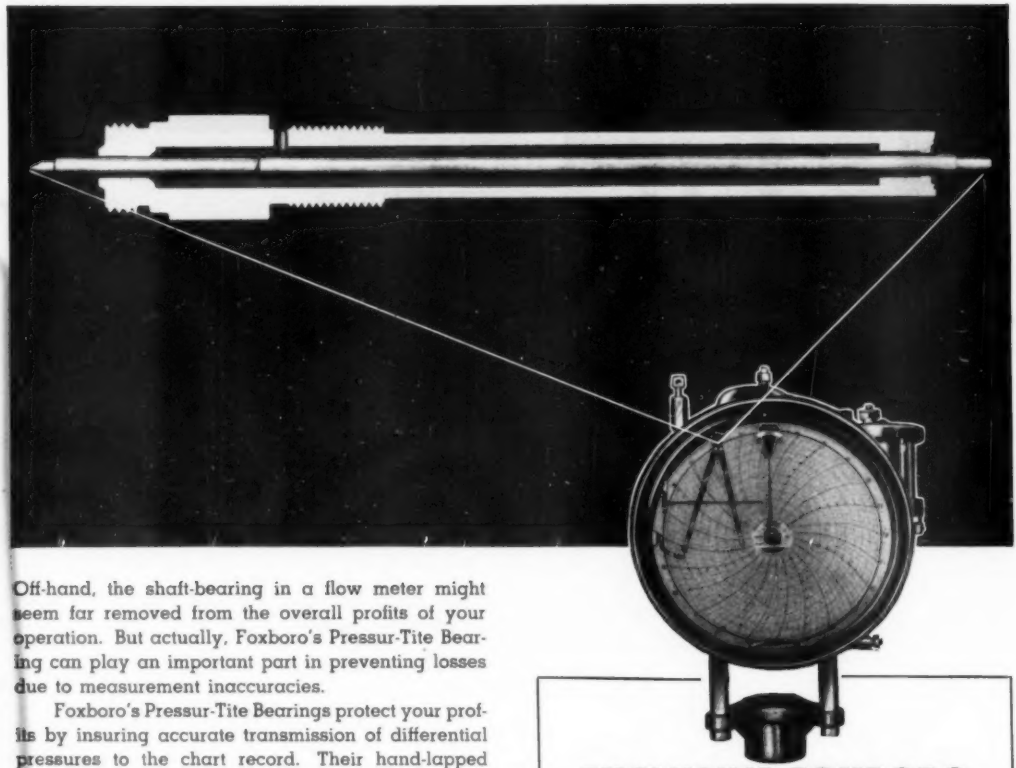
Reading, Pa. • Atlanta • Baltimore • Boston • Chicago • Denver • Detroit
Houston • New York • Philadelphia • Pittsburgh • San Francisco • Bridgeport, Conn.

R-P & C VALVE DIVISION
AMERICAN CHAIN & CABLE

READING-PRATT & CADY VALVES

TRADE MARK

What's This Bearing Got To Do with Your Operating Profit?



Off-hand, the shaft-bearing in a flow meter might seem far removed from the overall profits of your operation. But actually, Foxboro's Pressur-Tite Bearing can play an important part in preventing losses due to measurement inaccuracies.

Foxboro's Pressur-Tite Bearings protect your profits by insuring accurate transmission of differential pressures to the chart record. Their hand-lapped bearing surfaces give almost frictionless transmission and a permanent leakproof seal for pressures up to 5000 lbs. And they entirely eliminate troublesome stuffing-boxes!

This shaft-bearing is one of several specially-engineered details in a Foxboro Flow Meter that provide not only high initial acuracy in metering, but dependable, sustained accuracy throughout long periods between inspections.

Bulletin 351-1 gives full details of this and other better-engineered features of Foxboro Meters. Write for your copy. **The Foxboro Company, 104 Neponset Avenue, Foxboro, Massachusetts, U. S. A.**

EXCLUSIVE FOXBORO REFINEMENTS

- **Segmental Lever Transmission gives straight-line calibration.**
- **Extra-large Float with long travel for extra power.**
- **Sure-Seal Check Valves positively prevent mercury losses due to over-range.**
- **Pressur-Tite Bearing eliminates the friction of stuffing boxes or multiplication required with torque tubes.**

FOXBORO
REG. U. S. PAT. OFF.

MONEY-SAVING FLOW METERS

ELECTRUNITE

STAINLESS STEEL TUBING AND PIPE

- ★ NON-CONTAMINATING
- ★ RESISTANT TO RUST AND CORROSION
- ★ SANITARY...EASY TO CLEAN
- ★ RESISTANT TO HEAT
- ★ EASY TO FABRICATE
- ★ STRONG...LONG LASTING

ALSO AVAILABLE IN ADDITIONAL TYPES

Your nearby Steel and Tubes Representative will be glad to answer your questions about the proper application of ELECTRUNITE Stainless Steel Tubing and Pipe. Just let us know when you would like him to call.

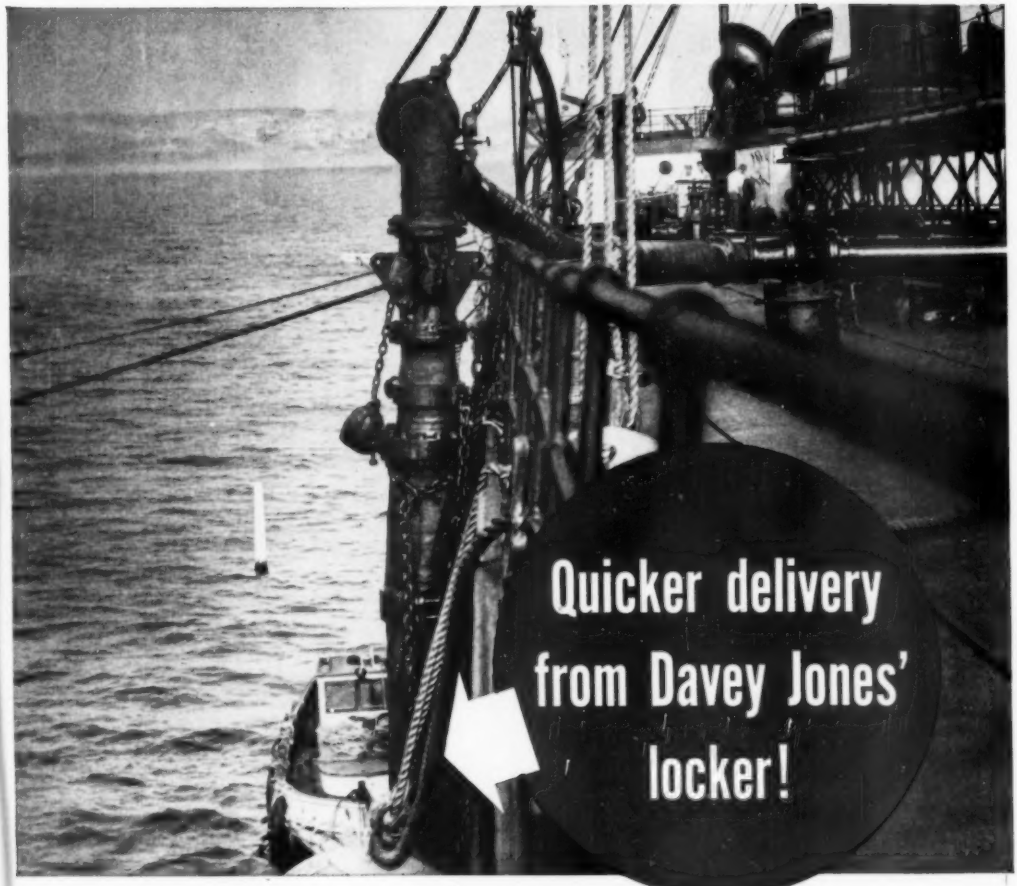
Pressure tubing for heat exchangers and condensers . . . piping for processing equipment . . . these are but some of the countless applications for long-lasting ELECTRUNITE Stainless Steel Tubing and Pipe throughout the petroleum industry.

As manufactured by the ELECTRUNITE Process, these modern tubular products are uniformly straight, strong and sound throughout every length and every shipment. And as indicated above, they are available in a wide range of analyses, gauges, sizes and shapes.

For complete information about ELECTRUNITE Stainless Steel Tubing and pipe, write today for a copy of Republic's new 28-page helpful fabricating guide.

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Dept.: Chrysler Bldg., New York 17, N.Y.

Republic
REPUBLIC STEEL
ELECTRUNITE
STAINLESS STEEL TUBING



Hewitt Sea Loading Hose gives you faster flow and longer service life

Here's how to move more petroleum faster . . . and reduce your costs at the same time.

Load and unload your tankers *offshore* with Hewitt Sea Loading Hose! This time-proved hose, which is connected to your submerged pipe line, gives you a flexible, free-flowing passageway from ship to shore.

Its smooth bore internal tube permits up to 50% faster flow! This gives you from 70 to 90% the carrying capacity of a rough bore hose 2" larger!

Furthermore, Hewitt Sea Loading Hose is extremely strong and tough. It's built to withstand terrific pressures, constant flexings, corrosive action and rough abrasive treatment. Special bead-wire reinforcement construction helps extend *service life* by millions of barrels!

For details phone the Hewitt distributor listed in the classified section of your phone directory. Or write to Hewitt Rubber Division, 240 Kensington Ave., Buffalo 5, N.Y.

HEWITT

Sea Loading Hose

HEWITT RUBBER DIVISION
INDUSTRIAL HOSE • BELTING • PACKING

Hewitt offers the oil industry a complete line of special hoses

For oil drilling:
- Rotary Drilling Hose
- Flexible Vibration Hose
- Mud Pump Suction Hose

For oil refining:
- Oil Suction and Discharge Hose
- Sea Loading Hose
- Barge Loading Hose
- Fire Hose
- Flue Cleaning Hose
- Steam Hose

For oil distributing:
- Tank Car Hose
- Tank Truck Hose
- Fuel Oil and Distillate Hose
- Gasoline Pump Hose

also Propane-Butane Hose for all types of service

HEWITT-ROBINS HR **INCORPORATED**

BUCYRUS-ERIE SPUDDERS

Are Hitting 'Pay' Across the U.S.A.

28-L in California

Despite the difficulty of drilling in caving shale formations with one and a half tons of tools strung on the drill line, this Bucyrus-Erie impressed the crews of three shifts with its fast, accurate response to controls while putting down a top-to-bottom well in Kern County, California. Besides being easy to operate, the mobile 28-L has big derrick and spooling capacities plus a heavy duty power plant, which enable it to handle profitably a wide variety of jobs in its work range.

BUCYRUS ERIE

28-L
Available for Prompt Delivery

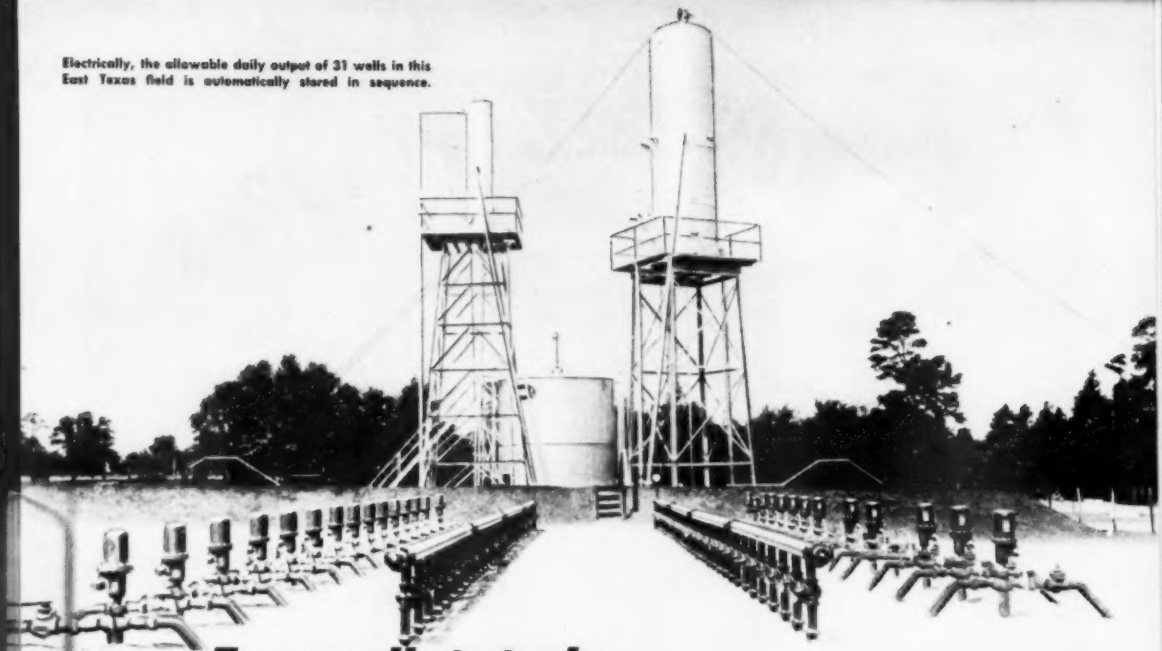
BUCYRUS-ERIE CO., South Milwaukee, Wis.

Drill Sales Division Offices in

DALLAS, TEX. • ENGLEWOOD, N. J. • EVANSVILLE, IND.

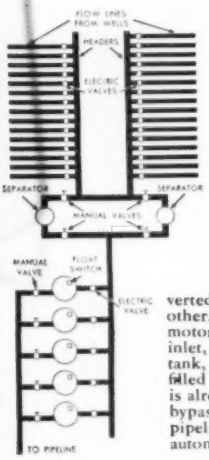
46549

Electrically, the allowable daily output of 31 wells in this East Texas field is automatically stored in sequence.



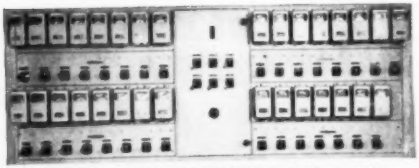
From wells to tanks– AUTOMATICALLY !

Another example of General Electric oil field electrification !



THIS IS THE WAY IT WORKS!

As this schematic layout shows, all well lines are opened and closed by motor-driven hydraulic valves, actuated by time switches. Any well can also be flowed by a manual valve in parallel with automatic valve. After passing through headers and separators, well flow is automatically diverted from one storage tank to another. This is done by means of a motor-operated valve in each tank inlet, a special float switch atop each tank, and a control panel. Tanks are filled in sequence, with any tank that is already filled or on pipeline being bypassed. If all tanks are full or on pipeline, the system shuts itself off automatically.



HERE'S THE HEART OF THE SYSTEM! This G-E central control panel, which governs the lease's entire producing schedule, contains master switch, manual tank-valve switches, and sequence selector. Flanking it are 31 G-E time switches and manual switches for all wells. Ample room at the bank of the panel makes for easy inspection and repair.

Here is just one of many illustrations of the savings that electrification can bring to oil production. In the case of this East Texas oil field, an electrically-controlled system utilizing General Electric control throughout now makes possible *automatic* control of the allowable production of 31 flowing oil wells and a battery of five storage tanks!

By eliminating manual operations, this electrified system reduces necessary walking to and from wells, since it requires little or no attention by the operator. This frees the operator for other duties, helps cut lease operation costs.

HOW CAN YOU CUT COSTS—ELECTRICALLY?

Whether your job is drilling, well pumping, or pipe-line pumping, there are plenty of ways in which electrification can help you do it more efficiently, more economically. They're described in Bulletin GES-3485, "More Oil at Less Cost—Electrically." Send for your copy today.

A MOVIE WORTH SEEING!

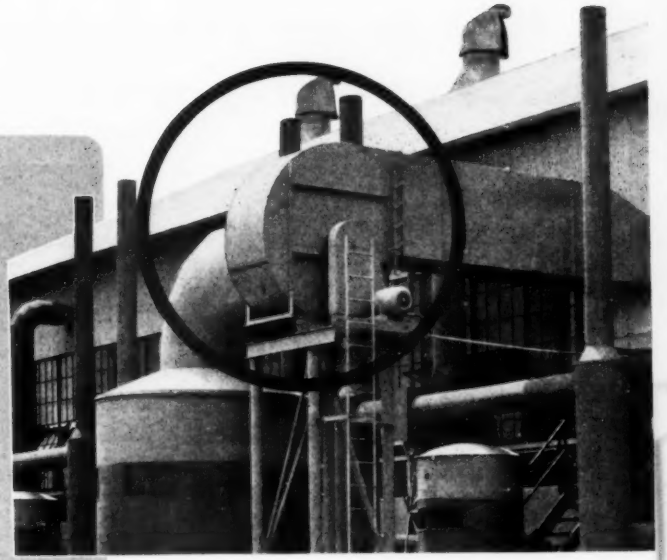
It's "Lease on the Future", a motion picture on oil field electrification, in full color and sound. Ask your nearest G-E office about having it shown to your organization.

More Power to America

Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

It's the *FAN* that "Powers" Your Air System



GET THE MOST FROM YOUR "AIR INVESTMENT" WITH "Buffalo" FANS

WHETHER you need air for air conditioning apparatus or ventilation or exhaust service, your selection of a fan has a lot to do with how *well* and how *long* the system will work.

"Buffalo" Limit-Load Fans are giving top value in all types of systems—quiet, attention-free service at rock-bottom operating cost. They're durable on the job—*"Buffalo" Fans have been in constant service as long as 54 years.*

When you want more for your money in air moving, pick the fan that many leading consulting engineers pick—"Buffalo" Limit-Load. Bulletin 3567, above left, gives all the engineering facts, plus the many sizes and arrangements available. WRITE FOR YOUR FREE COPY.

How VALUABLE is *Fan Engineering* to YOU?

Read What a Chief Engineer Says: "A 1938 copy does exist in my office and has been found of immeasurable value. As this . . . is used by all the engineers in the office, you can imagine that after 10 years' constant use the veteran is due for retirement."

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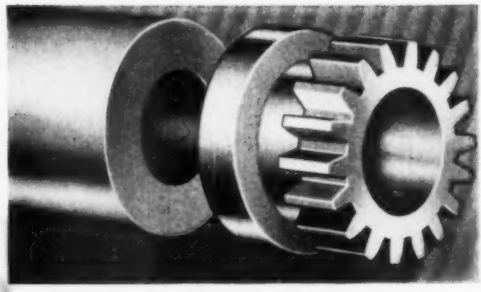
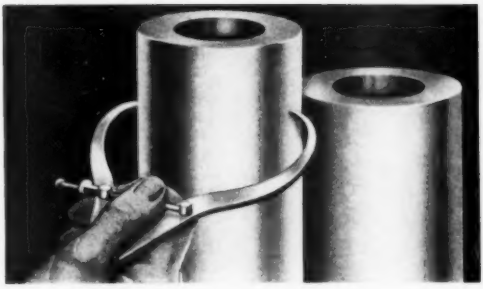
Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Branch offices in all Principal Cities

VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

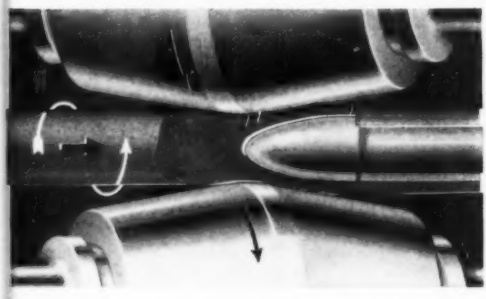
How to cut production costs and improve quality with TIMKEN® tubing



YOU SAVE MATERIAL COSTS, machining time, and boost production when you make cylindrical parts from Timken® seamless tubing instead of bar stock. There's no center hole to drill . . . less stock to machine. Boring is eliminated or reduced to a rapid finishing operation.



OUR TUBE ENGINEERING SERVICE makes possible even greater savings, because it will select the most economical tube for your job—guaranteed to clean up to your finished dimensions. This service has proved so valuable to parts makers that 90% of Timken seamless tubing is now bought on this basis.



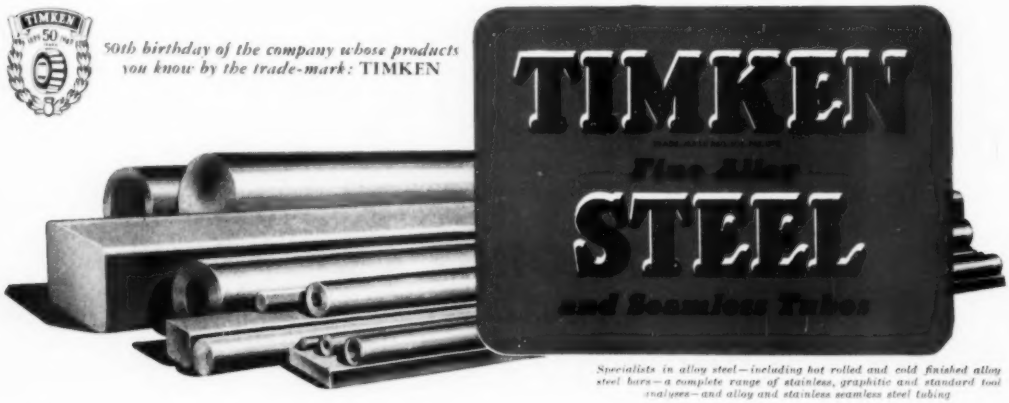
BASICALLY A FORGING OPERATION! In the piercing of Timken tubing, red hot billets are worked between the rolls with a spiral, kneading action that gives a uniform spiral grain flow and refined grain structure. The result is uniform, fine forged quality from one end to the other in every tube.

All you have to do is give us this information:

1. **FINISH MACHINED DIMENSIONS,** i.e.—The maximum machined O.D. x minimum machined I.D. x length. A blueprint is most desirable. Dimensions should include applicable tolerances. If only finished ground dimensions are applicable or available this should be noted.
2. **MACHINING**—Is part held on O.D. or I.D. during the initial machining operation? Complete sequence of operations when practical.
3. **FINISH OF TUBING DESIRED**—Hot Rolled, Cold Drawn, Rough Turned, Roto-rolled or Centerless Ground.
4. **CHEMICAL ANALYSIS AND OTHER SPECIFICATIONS.**

FOR AN ANALYSIS OF YOUR REQUIREMENTS, send the data indicated above. No cost or obligation. And ask for our informative booklet, "Facilities and Products". The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

50th birthday of the company whose products you know by the trade-mark: TIMKEN



Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing

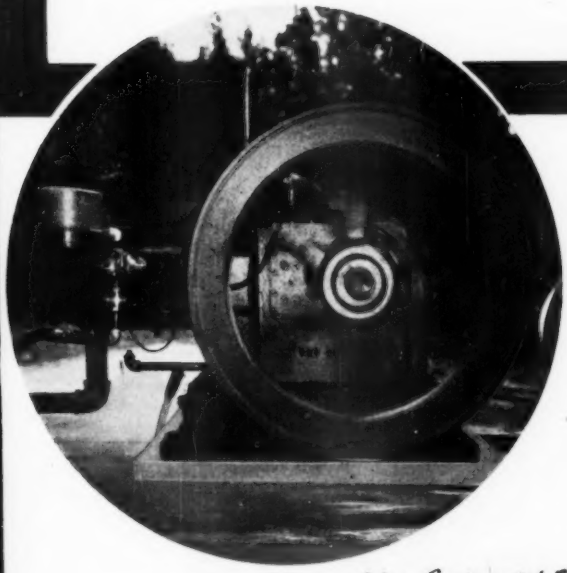
THE BULLDOG HAS A SHORT SNOUT*

**Designed for a Specific Purpose*

THE CSCO PUMPING ENGINE

. . . Designed for a Specific Purpose

TO PUMP OIL!



Men long experienced in oil well pumping engineered the CSCO line of Pumping Engines "from scratch" to meet all operational requirements. No engine originally created for another purpose was used as a pattern. There was no compromise in designing an engine for one specific purpose—*to pump oil.*

An ever increasing number of CSCO Pumping Engines have been placed in service during the four years since it was introduced. Many are operating 24 hours a day, month in and month out, under every possible condition.

No engine other than the CSCO-96, -66 or -46 offers such features as these: *Enclosed to conquer dirt . . . Pressure Lubricated to conquer wear . . . Steam Cooled to conquer heat and cold . . . Heavy Flywheel to conquer peak load.*

Ask a Continental Man **for complete details**

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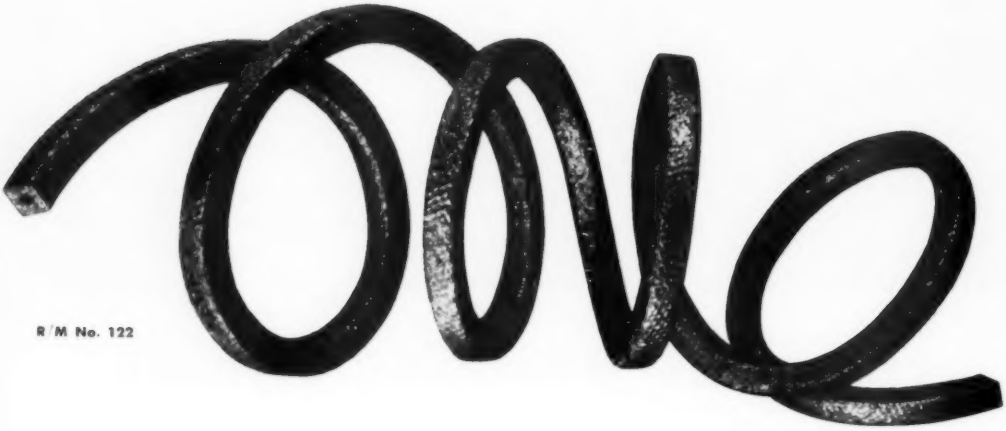
Export Division: 30 Rockefeller Plaza, New York, N. Y.

epresentatives: ARGENTINA • BOLIVIA • BRAZIL • CHILE • CHINA • COLOMBIA • ENGLAND • ECUADOR • PERU • TRINIDAD • URUGUAY • VENEZUELA

R/M high pressure packing



R/M No. 122

Raybestos-Manhattan makes a variety of high pressure packings for steam engines, air or gas compressors, steam pumps, expansion joints, and other high pressure equipment.

R/M High Pressure Packing—Rubber Back, No. 121—is a quality product with a core of asbestos cloth and a resilient rubber cushion covered with asbestos cloth. It gives satisfactory service at temperatures up to 600°F.

R/M High Pressure Packing—Center Core, No. 122—consists basically of a round, heat-resistant, rubber core, covered with bias-cut asbestos cloth made from selected fibres. It is also available with wire reinforcement and is recommended for reciprocating steam or air rods, valve stems, and other applications where surface speeds are under 600 f.p.m. and temperatures are not over 600°F. It can also be obtained solid without rubber core or back for higher temperatures (No. 124).

For the complete story of R/M packings for oil field, pipe line, or refinery equipment, talk to your oil field supply store, or the authorized R/M packing distributor near you. These men will be glad to recommend packing for your use and to give you copies of the R/M Packing Catalog.

RAYBESTOS-MANHATTAN, INC.

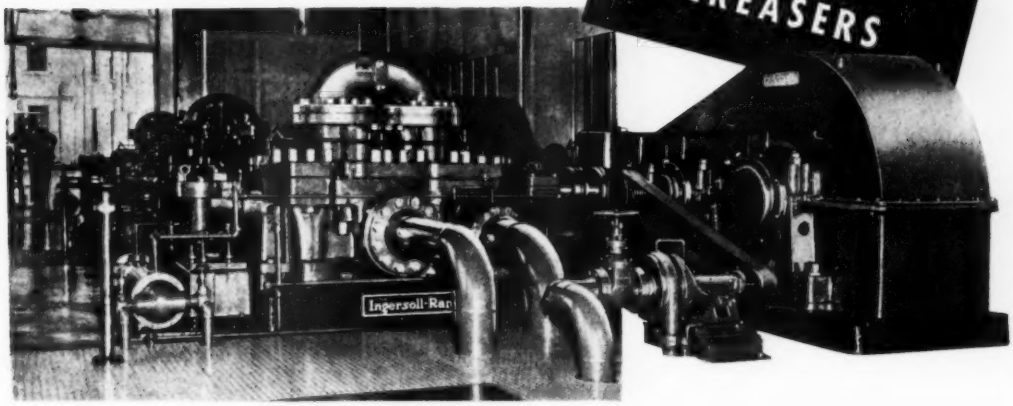
PACKING DIVISION, MANHEIM, PA.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Packings • Asbestos Textiles • Mechanical Rubber Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Powdered Metal Products • Bowling Balls

Another outstanding installation of...

FARREL SPEED INCREASERS



Farrel speed increasing units of the double step-up type are made with ratios ranging from 12:1 to 40:1. Single step-up units are available in 49 standard sizes with speed ratios from 1:1 to 12:1.

Three of these double step-up units, at Ohio Oil Station, Martinsville, Illinois, are each transmitting 1300 HP from 240 RPM Diesel engines to centrifugal pumps operating at 3150 RPM.

Gears and pinions are *precision-generated* by the famous Farrel-Sykes process. The first step-up is handled by continuous tooth herringbone gears—the well-known *Gear with a Backbone.* For the second step-up, twin sets of single helical gears with opposed helices are used.

Other features, which assure continuous, efficient service throughout a long life, include: Oversized shafts, ground to close tolerances . . . precision bearings . . . a self-contained circulating oil system . . . and a heavy, cast, double-walled base.

Full information about the complete line of Farrel single and double step-up units will be sent to you promptly, on request.

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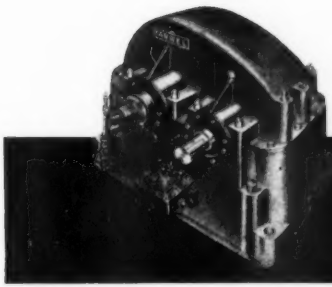
OIL FIELD REPRESENTATIVES:

Hercules-Lupfer Engine Sales Co., 124 N. Boston St., Tulsa, Okla.
V. W. Osborne, 822-A M & M Building, Houston 2, Texas



FB-524

Farrel-Birmingham

KONTOL

PROTECTS SUB-SURFACE PUMPING EQUIPMENT *against* CORROSION

CORROSION PREVENTIVE

A TRETOLITE COMPANY PRODUCT

INSURES LONGER USEFUL LIFE

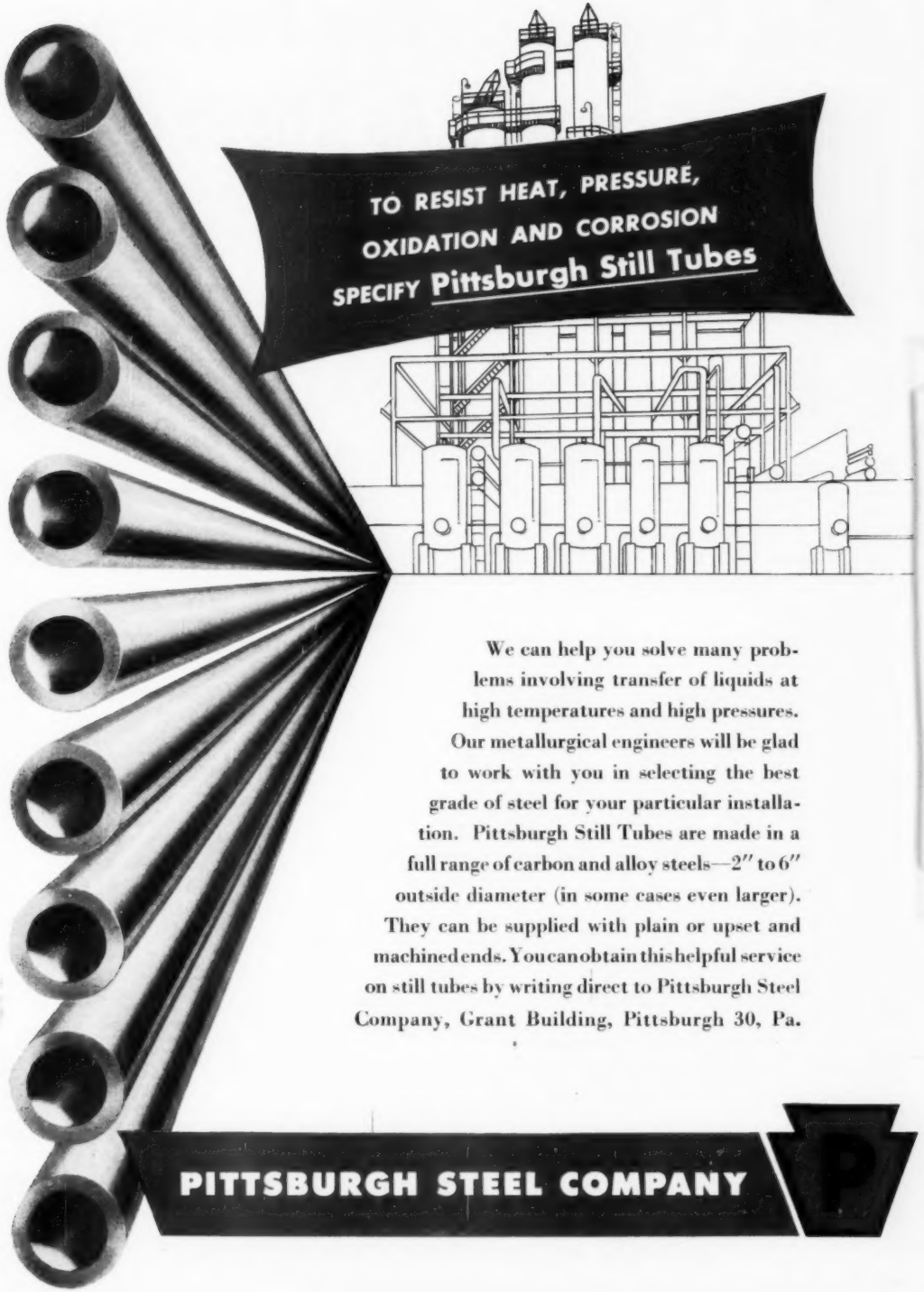
RODS
PUMPS
TUBING
CASING

KONTOL forms a strongly adsorbed film on metallic sub-surface equipment, preventing contact by corrosive elements. It has been tested and proved effective in gas, gas-condensate, sweet and sour crude wells. It is easy to apply by chemical pump injection or batch-dumping down the well annulus.

For complete details on KONTOL, and information on the KONTOL corrosion rate test service, write or call

KONTOL

TRETOLITE COMPANY
Manufacturing Chemists
St. Louis 19, Missouri
Los Angeles 22, California

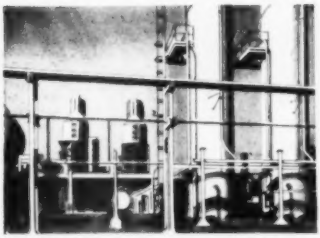


We can help you solve many problems involving transfer of liquids at high temperatures and high pressures. Our metallurgical engineers will be glad to work with you in selecting the best grade of steel for your particular installation. Pittsburgh Still Tubes are made in a full range of carbon and alloy steels—2″ to 6″ outside diameter (in some cases even larger). They can be supplied with plain or upset and machined ends. You can obtain this helpful service on still tubes by writing direct to Pittsburgh Steel Company, Grant Building, Pittsburgh 30, Pa.

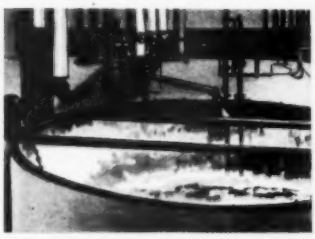
PITTSBURGH STEEL COMPANY

Are Your Corrosion Problems As Severe As These?

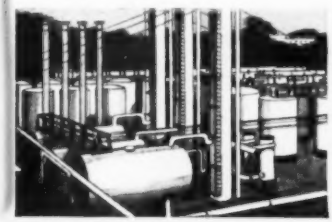
You won't be discouraged by any corrosion problem, when you read how these four companies have finally controlled extremely severe corrosion in their plants with a system of UCILON Protective Coatings!



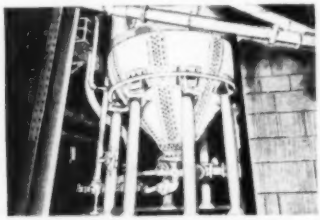
1. A WELL KNOWN REFINERY had Ucilon coatings applied to ducts exhausting oil and gasoline fumes at the cracking tower. One year after application, there was still not a sign of failure, despite the severity of the service.



2. A SOAP PLANT had a tough ceiling maintenance problem—some ordinary paints being destroyed by fatty acid vapors in as little as 2 weeks. Yet after *6 months* of exposure, Ucilon coatings were still totally unaffected!



3. A CHEMICAL PROCESSOR coated a steel storage tank with a Ucilon coating system. Especially hard on protective coatings, the tank's contents broke down two other coatings tried—one in 6 weeks. Yet Ucilon is still in good condition after *14 months!*



4. A PAPER MILL tried Ucilon 400 on a pulp chute that had required excessive maintenance under constant motion of pulp, soda ash and water at 140 F. Even with fewer coats, Ucilon lasted *3 times* longer than former coatings!

UCILON* 400

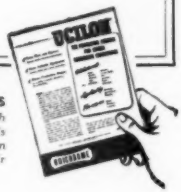
Ucilon 400 is a flexible, glossy, air-drying coating for metal, concrete and wood. It is applied by brushing or spraying. When solvents evaporate, a tough "plastic" film is formed. Ucilon 400 provides exceptional resistance to acids, alkalies, alcohols, oils and greases, salts, water, cleaning compounds, oxidizing agents.

OTHER UCILON COATINGS

Ucilon 1601—a ready-mixed, extra-bright aluminum paint with exceptional outdoor resistance. It stays bright under prolonged exposure, withstands elevated temperatures.

•

Ucilon 1501—a very hard, chip-resistant baking coating which resists chemical attack at temperatures higher than recommended for Ucilon 400.



SEND FOR THIS BULLETIN *which gives more details on various Ucilon coatings and their properties.*

Similar reports continue to arrive from plants of every nature. Maintenance men are discovering a degree of corrosion protection and service life they never achieved with any coating tried before. If *you* have an exceptionally tough coating problem, we're confident that there's a Ucilon coating system to help you stop corrosion damage and vastly lengthen the period between your paint jobs. Let us send you our specific recommendations without obligation. Write today, outlining the details of your application.

*Trade Mark Reg. U. S. Pat. Off.

UCILON Protective Coatings

UNICHROME products of UNITED CHROMIUM, INCORPORATED

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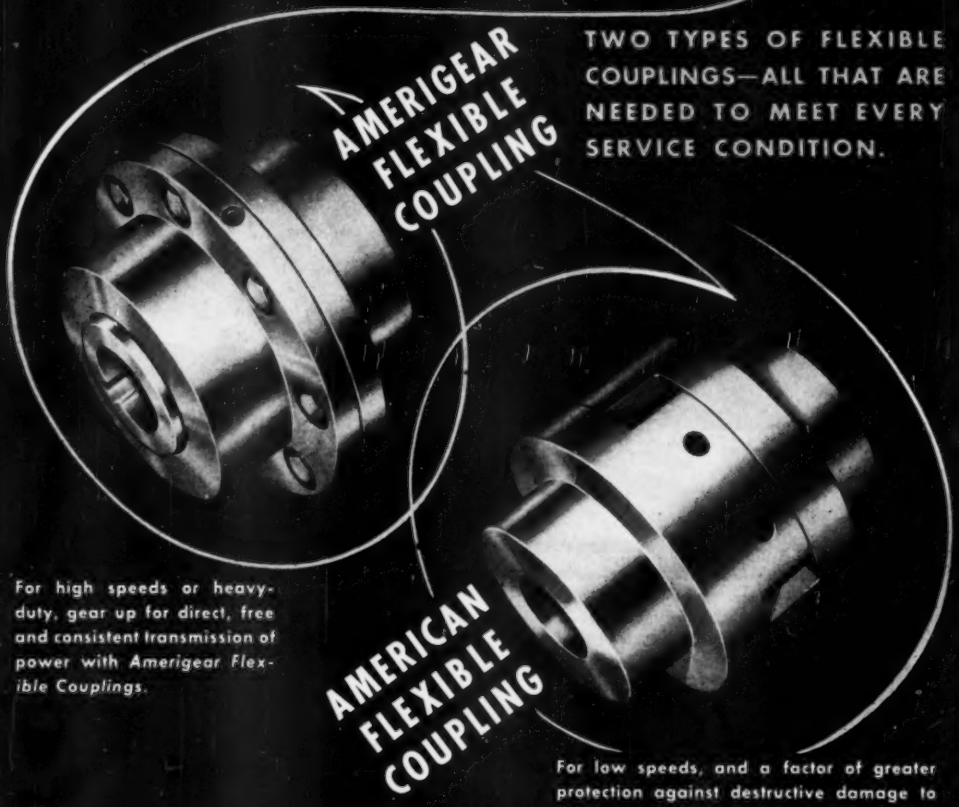
Seek POWER TRANSMISSION At Its Best

AMERICAN
FLEXIBLE COUPLINGS
meet every test

TWO TYPES OF FLEXIBLE COUPLINGS—ALL THAT ARE NEEDED TO MEET EVERY SERVICE CONDITION.



For high speeds or heavy-duty, gear up for direct, free and consistent transmission of power with *Amerigear Flexible Couplings*.

For low speeds, and a factor of greater protection against destructive damage to driven mechanisms, use *American Flexible Couplings*—the only couplings with a floating center member equipped with replaceable bearing strips.

AMERICAN FLEXIBLE COUPLING CO.
AFFILIATE OF J. A. ZURN MFG. CO.
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We Are Seeking Power Transmission At Its Best. Please send:
☐ Booklet "Relief from Bearing Wear Grief".
☐ American Flexible Couplings Catalog No. 41.
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Company _____
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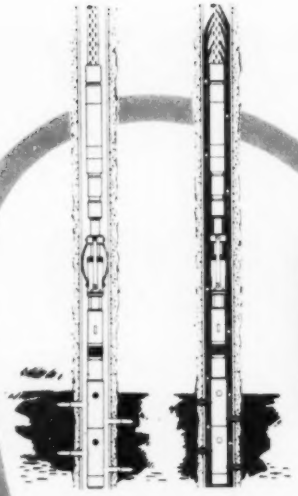

SHOOT-N-TEST
Trademark
JOHNSTON FORMATION AND CASING TESTING

PERFORATE AND TEST in a single run

The Johnston "Shoot-N-Test" Gun Perforator at moment of fire

Following perforation, formation fluid enters Johnston Tester assembly

Q. When does 1 plus 1 equal 1?

A. When you perforate and test in a single run with Johnston "Shoot-N-Test" Gun Perforator and Johnston Formation Tester

Eliminate one round trip with this combination . . .

The Johnston "Shoot-N-Test" and the Johnston Formation Tester both perforates and tests any designated formation in one round trip of tubing or drill pipe. The entire run - trip in, perforating, water shut-off information, exploratory work or testing for actual production, and trip out - - is recorded by the Johnston Pressure Recorder.

M. O. JOHNSTON OIL FIELD SERVICE CORPORATION
3035 Andrita St., Los Angeles 41, Calif.
Serving California—Rocky Mountains—Canada

JOHNSTON OIL FIELD SERVICE CORPORATION
5702 Navigation Blvd., Houston, Texas
Serving Mid-Continent—Permian Basin

If you're interested in information on cutting hours off completion time—saving wear and tear on equipment—getting wells on production faster—get in touch with Johnston!

COMPLETE ENGINEERING Survey of Large Sewers Requires—More Pictures

This photo shows the outlet of the sewer. Note that bricks are missing from the invert of the sewer and the mortar has disintegrated in the coping.

Note in this picture particularly the settlement of the earth approximately 50 feet from the outlet. This is probably caused by a leakage from the sewer.

The results of the inspection, study and many photographs of the interior condition and construction of the sewer indicate a deterioration of the structural components materially weakening it. This, and the importance of this particular sewer led to the recommendation for the immediate consideration of a new and larger sewer.

Call in the Pittsburgh Pipe Cleaning Engineering Department TODAY for a complete survey of your piping problems.

Pittsburgh Pipe Cleaner Company offers Today one of the most Complete Engineering Services available in the Industrial Water Supply and Disposal Fields.

PITTSBURGH PIPE CLEANER COMPANY

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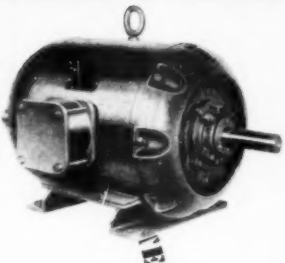
wherever motor hazards lurk... Specify WAGNER PROTECTED MOTORS

Do you use motors in locations where dirt, filings, moisture, splashing liquids, acid fumes, explosive gases, or other motor hazards lurk? No matter how severe the operating condition, Wagner has the right motor for your purpose—adequately protected against such hazards. Five types of Wagner protected motors are shown below.

PROTECTED · PROTECTED

1. Wagner Totally-Enclosed Motors . . .
PROTECTED against dust, dirt, abrasives, steel chips, filings, acid fumes, and other harmful elements that may damage the windings and bearings.

2. Wagner Explosion-Proof Motors . .
PROTECTED to prevent explosion in locations where gasoline, petroleum, naphtha, alcohols, acetone, lacquer solvent vapors, or natural gas are manufactured, used, or handled. Approved by Underwriters' Laboratories for Class I Group D hazardous locations.



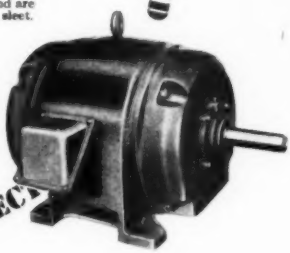
PROTECTED

3. Wagner Drip-Proof Motors
PROTECTED to keep dripping liquids, falling metal chips and other particles from entering the motor.

4. Wagner Splash-Proof Motors . . .
PROTECTED against splashing or dripping water, oil, or other liquids. They are widely used in exposed outdoor locations, and are completely self-protected against ice, sleet, snow and rain.

PROTECTED

5. Wagner Chemical Plant Motors . . .
PROTECTED to resist the action of acids, fumes, moisture and other harmful elements encountered in chemical manufacturing.



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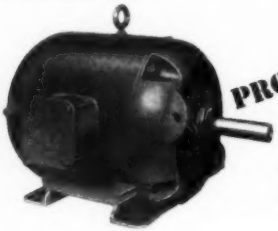

Bulletin MU-185 gives full information on the complete line of Wagner Motors. Write for your copy today.

Wagner Electric Corporation
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Consult Wagner Engineers on all Electric Motor Problems

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Stainless Steel is TOUGH

tough to cut, too—but LINDE makes the job easier . . . just as easy as cutting carbon steel

LINDE'S powder-cutting process overcomes the barrier to fast and economical cutting of stainless or chromium steels.

By means of easily installed attachments for standard oxy-acetylene equipment, powder-cutting can be done without substantial change from carbon steel cutting techniques.

IN FOUNDRIES—

by powder-cutting, risers are removed 20 times faster than by older methods. Removal of riser pads and gouging out defects can be done at considerable savings in cost.

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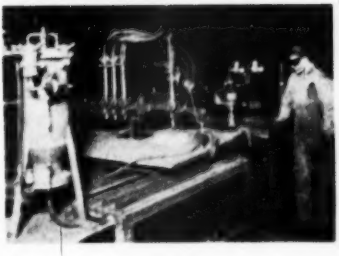
a 12,000-lb. ingot can be powder-scarfed in 4 to 6 hours—about 1/10 the time required for grinding. Sizing of ingots, billets, and slabs, removal of hot tops, scrapping operations, and many other cutting jobs can be done in a fraction of the time previously required.



IN FABRICATING PLANTS—

a stack of twelve 10-ga., type-304 stainless sheets were powder-cut at 8 in. per min. . . . 4-in. I.D. by 8-in. O.D. flanges on ½ in., type 316 plates were made in 2 minutes of cutting time apiece.

If you work with stainless steel you will want to know more about this LINDE process. LINDE can supply the equipment you need, help you to set up, and supply the training help you need.

Linde

The word "Linde" is a registered trade-mark of The Linde Air Products Company.

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Unit of Union Carbide and Carbon Corporation

30 East 42nd St., New York 17, N.Y. UCC Offices in Other Principal Cities

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IN MORE WAYS THAN ONE—
YOU'LL TAKE THE *KINKS* OUT OF DRILLING...

with NEW HUNT Swivel Joints and HUNT All-Steel Drilling and Cementing HOSE

HUNT All-Steel Drilling Hose, 55 ft. folded section shown here, with 7 Hunt Swivel Joints providing 17 swivel movements.

Available for 5,000 lb. (1" through 4" sizes) or 10,000 lb. (2" only) working pressures . . . equipped with the *new* HUNT Swivel Joints (Roofe patents) . . . HUNT *All-Steel* Hose for drilling and cementing operations give you the SAFEST and EASIEST swiveling hose in the field.

HUNT *All-Steel* CEMENTING and DRILLING Hose provides as many swivel movements as desired—no more twists or kinks, nor lost time due to restricted hose movement in cementing or drilling.

The new HUNT Swivel Joints are designed so that cement, mud, caustic mud additives and other abrasives can not reach the joint's bearings. Neither internal or external pressures can dislodge this joint's packing during lubrication—*not even lubrication under full working pressure!*

And if you want greater operating freedom with any *rubber* hose—install HUNT Swivel Joints on both ends. Because your hose will then automatically extend itself to full length, the same length of hose will do the work of *an added 10 feet of hose!* Because your rubber hose will no longer twist, kink, or suffer other injurious distortions—you'll get faster drilling operations and longer hose life when you install HUNT Swivel Joints.

It will pay you to write *today* for our new catalog!

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You can't buy A LOWER COST-PER-YEAR VALVE than

HOMESTEAD-REISER *Self-Sealed* LUBRICATED PLUG VALVES

They are the lowest-priced, full-port-area plug valves in their pressure and temperature range

And they *outlast* all other lubricated plug valves in their class. Every one of their many outstanding advantages including

100% area of standard pipe
100% lubricant seal around ports
Extreme economy of lubricant
Single lubricant for wide variety of applications, and
Self-sealing automatic adjustment for wear

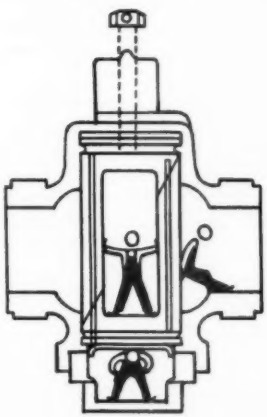
. . . are features asked for by engineers and operating men of industry.

Proof of their long, economical, dependable performance has been established in practically every industry during the past seven years. And at their new low price, they are more than ever your lowest cost-per-year fluid control.

Why not send today for your free copy of Valve Reference Book No. 39-5? *It shows sizes, types and pressure ratings for Homestead-Reiser Valves.*

How the "*Self-Sealed*" Principle Works

In addition to a full lubricant seal around the ports and around the top and bottom of the valve, the wedge-action of the plug under line pressure, constantly presses the finely-finished surfaces of the plug outward against the seating surfaces of the body. This self-sealing action keeps the plug surfaces in contact at all times with the mirror-like bore of the body. The plug thus automatically adjusts itself for wear, assuring extra long life and maximum leakless service.



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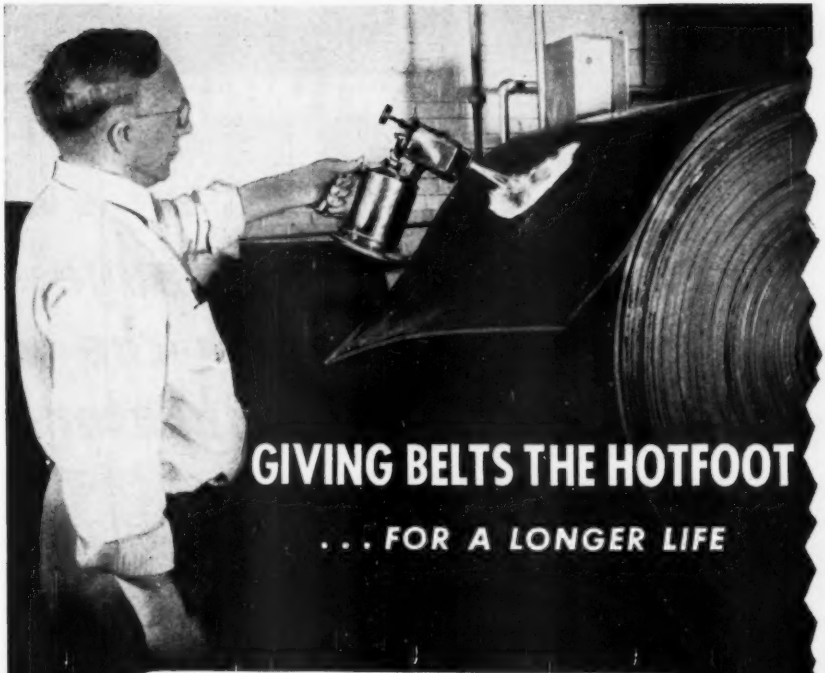
"Serving Since 1892" P. O. Box 403, Coraopolis, Pa.



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. . . FOR A LONGER LIFE

QUAKER CONVEYOR BELTS PRE-TESTED 18 TIMES TO ASSURE LONG LIFE UNDER MOST SEVERE CONDITIONS

Whether it is moving rock on conveyor belts or driving a rig in the field . . . Quaker Belts are made to take the roughest wear. They're pre-tested and torture-tested when they are made to withstand every operating condition encountered in the oil industry.

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Whatever your need for industrial rubber products there's a Quaker Pre-tested Product for the Petroleum Industry. Power transmission belting . . . rod and sheet packings . . . moulded and braided hose . . . and all kinds of custom-made moulded rubber products. To economize it pays to Quakerize your operations.

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Hose for air, steam, water, oil, gas, fire or paint, Quaker makes it and makes it to fit the particular needs of industry . . . each length is pre-tested for peak performance.

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Flat belts or V-belts, Quaker has the one to fit the drive . . . to transmit maximum horsepower at the lowest operating cost . . . all pre-tested to assure peak performance.

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MARSH

... the gauge with the "Recalibrator"

Any pressure gauge can be knocked out of adjustment, but when it's a Marsh Gauge you can quickly correct it with the twist of the "Recalibrator" screw.

This is not only the handiest way to correct a gauge; it is also the best way. Conventional methods of adjustment simply compensate for the error. The "Recalibrator" corrects the relationship between the movement and the bourdon tube—actually *does re-calibrate* the gauge.

JAS. P. MARSH CORPORATION, Dept. L, Skokie, Illinois

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The Marsh line includes gauges especially designed for blenders, boilers, burners, capping, Christmas trees, columns, heaters, hydrogen units, instrument panels, pumps, Reid vapor bombs, scrubbers, separators, mud pumps, stills, towers and other applications including oxygen and welding gauges. Ask on your letterhead for new catalog just off the press.

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Pattern FOR Permanence

JOBS that call for a permanent pile foundation call for Raymond equipment, Raymond experience and Raymond skill. From preliminary soil investigation to completed foundation, you can be sure that the Raymond organization will work swiftly, accurately and at minimum cost.

Raymond cast-in-place concrete piles cannot be excelled for permanence and carrying capacity. Many types are available to meet any subsoil condition. With Raymond on the job, full compliance with job requirements is assured.

Pictured above is Raymond's 1300-pile foundation for the new Caterpillar Tractor Company Building LL at Peoria, Ill.

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Of United States and Latin America

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52 YEARS FOUNDED 1897 OF PROGRESS

THE SCOPE OF RAYMOND'S ACTIVITIES includes every recognized type of foundation construction—concrete, composite, precast, steel, pipe and wood piles. Also caissons, underpinning, construction involving shore protection, shipbuilding facilities, harbor and river improvements and borings for soil investigation.

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you can always depend on...
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NORVELL-WILDER
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Quick service and complete stock SAVE YOU TIME and MONEY

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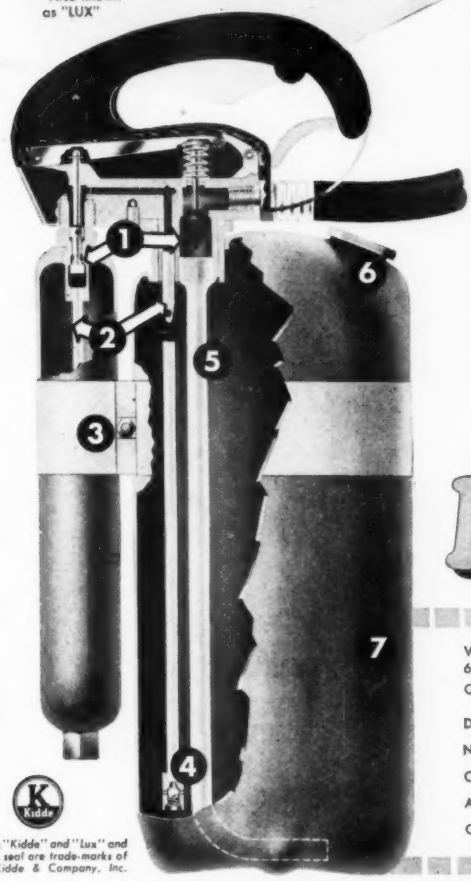
A New DRY CHEMICAL EXTINGUISHER WITH Trigger-Finger Control

(nothing new to learn)

Here, at last, is an extinguisher that's designed *right* to make the most effective use of an effective fire-extinguishing agent. *Kidde* Dry Chemical Extinguishers—made in 20- and 30-pound capacities—are operated simply by pulling a trigger—the same familiar, time-tested method used on all *Kidde** carbon dioxide (CO_2) extinguishers.

*Also known as "LUX"



PLUS these 10 other big features

1 ***Simultaneous opening of CO_2 and powder valves.*** No trapping of gas pressure in powder chamber *before* the discharge starts.

2 ***Quicker transfer of pressure to powder chamber.*** Siphon tube carries CO_2 to outlet in powder chamber, where it expands to a gas.

3 ***CO_2 cartridge easily replaced.*** Just loosen name band holding cartridge—then unscrew cartridge. Same size cartridge for both 20- and 30-pound extinguishers.

4 ***CO_2 fluffs up powder—prevents packing.*** Small port at bottom of CO_2 outlet tube allows gas to stir up powder.

5 ***Powder discharges from top through siphon.*** No danger of packing at hose connection.

6 ***Powder filler cap needs no tools.*** Unscrews easily for refilling of extinguishers in the field. Filler cap is safety-vented.

7 ***Lightweight cylinder for ease of carrying.*** Pound for pound, the *Kidde* Dry Chemical Extinguisher packs more fire-fighting punch!

8 ***Better powder dispersion pattern.*** Diffusion baffle in horn gives greater coverage, more effective application. No shut-off valve in horn to trap powder under pressure in hose. No rodding out of hose after use.

9 ***Extinguisher tested for operation at*** −40°F.

10 ***Improved powder and packaging.*** Powder specially processed to make it free-flowing; packed in weatherproof containers. 30-pound carton contains three 10-pound cans—for easy refilling of either 20- or 30-pound extinguishers. 50-pound containers also available.

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Kidde

Mail the coupon for full information.

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Gentlemen:

Please send me further information on the *Kidde* Dry Chemical Extinguisher.

Name.....

Company.....

Address.....

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The words "Kidde" and "Lux" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Never omit the "Composite Valve" — in any cost-wise planning

CALL IT THE "COMPOSITE VALVE"—the giant that would result if *all* the valves in a plant were *one* valve. As pictured here, its proportion to other equipment in this detailed model of an automobile factory is fairly accurate. Representing your total valve investment, its size may surprise you, but it must be considered in any plan for economical plant operation.

IT PAYS to keep *your* "composite valve" in mind at all times . . . and thus avoid the common error of dismissing valves as a comparatively unimportant investment. With wages and material costs the highest ever, your total valve expense warrants the same careful attention that you give to operating costs of larger plant units.

EXCESSIVE MAINTENANCE of one inferior valve is insignificant, but multiplied by thousands, it is a serious drain on operating budgets. JENKINS BROS. helps you meet this problem two ways. First, by building extra endurance into Jenkins Valves, making them the longest-lasting, lowest-upkeep valves that money can buy. Second, with advice from Jenkins Engineers on any question of proper selection, installation, or maintenance.

For all new installations, for all replacements, rely on Jenkins quality and engineering for lowest valve costs in the long run. Sold through leading Industrial Distributors.

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Jenkins Bros., 80 White St., New York 13; Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal.

"PRACTICAL PIPING LAYOUTS" is a 32-page book containing diagrams and descriptions of 25 basic piping layouts with complete recommendations for valve selection and location in the lines. Tells you "which valve where for best performance". FREE on request. Write JENKINS BROS., 80 White Street, New York 13, N. Y.

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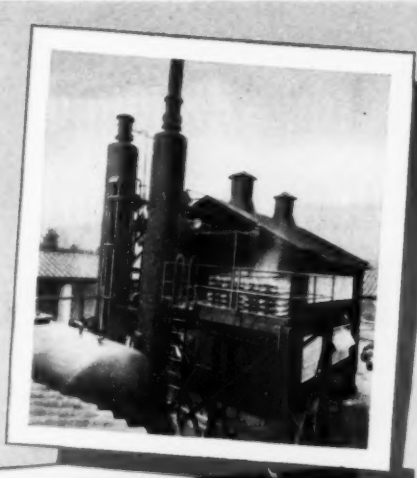
Types, Sizes, Pressures, Metals for Every Need

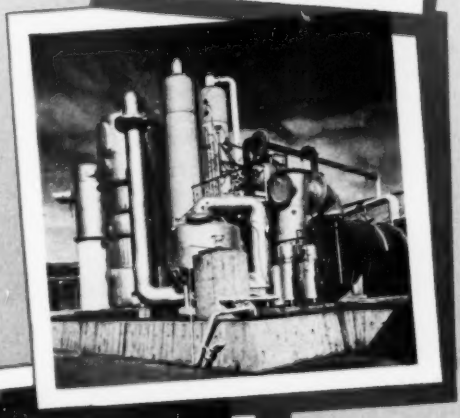
How Much Sulfuric Acid *Do You Want To Produce?*



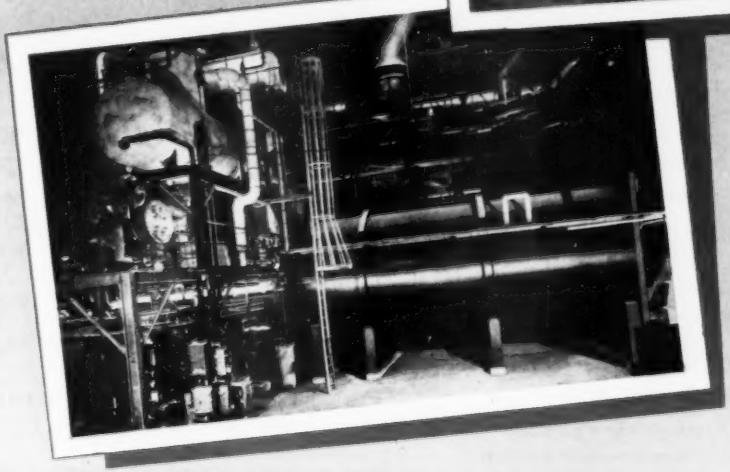
5 TONS PER DAY
MEDELLIN, COLOMBIA, SOUTH AMERICA

5 tons per day? 500 tons? Something in between? Whatever your sulfuric acid requirements, Chemico will design and furnish you with a plant tailor-made to fit your needs.

Chemico takes complete responsibility . . . turns over a highly efficient contact sulfuric acid plant on a one-contract, guaranteed-performance basis. Write for full information.



25 TONS PER DAY
HONOLULU, HAWAII



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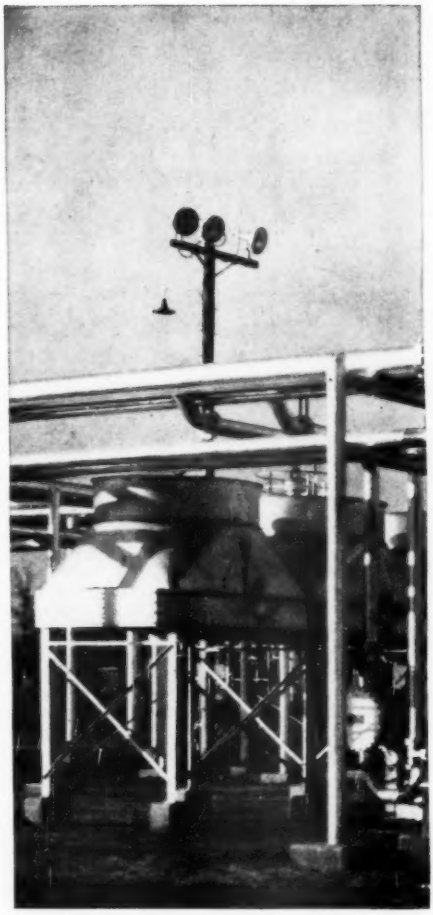
Chemico plants are profitable investments

6 Tough Cooling Duties in 1 Plant Handled by 1 Model ALCO Exchanger



The Skelly Oil Company gas plant at Velma, Oklahoma, built by the Born Engineering Company of Tulsa, presented a unique problem in certain process cooling requirements. Six different cooling jobs had to be handled in one battery, calling for different heat loads, temperature ranges and operating pressures.

One Alco air-cooled heat exchanger model (the uni-bundle*) was selected to handle all these cooling duties. The customer advises "Units are operating successfully at over design-capacity." A fine example of how Alco *standardized* air-cooled exchangers can be tailored to suit customer needs—simplifying operation, maintenance, replacement of parts. Alco's *standardized* models bring low cost per year of operation and multiple savings in upkeep costs.

*Trademark patented

ARE YOU FACED WITH ANY OF THESE COOLING PROBLEMS?

- Insufficient water supply
- Scale from bad or brackish water
- Expensive water treatment
- Difficult waste water disposal
- High pumping costs
- High relative humidity
- Excessive space requirements for cooling basins

THEY CAN BE SOLVED INEXPENSIVELY BY ALCO AIR-COOLED EXCHANGERS

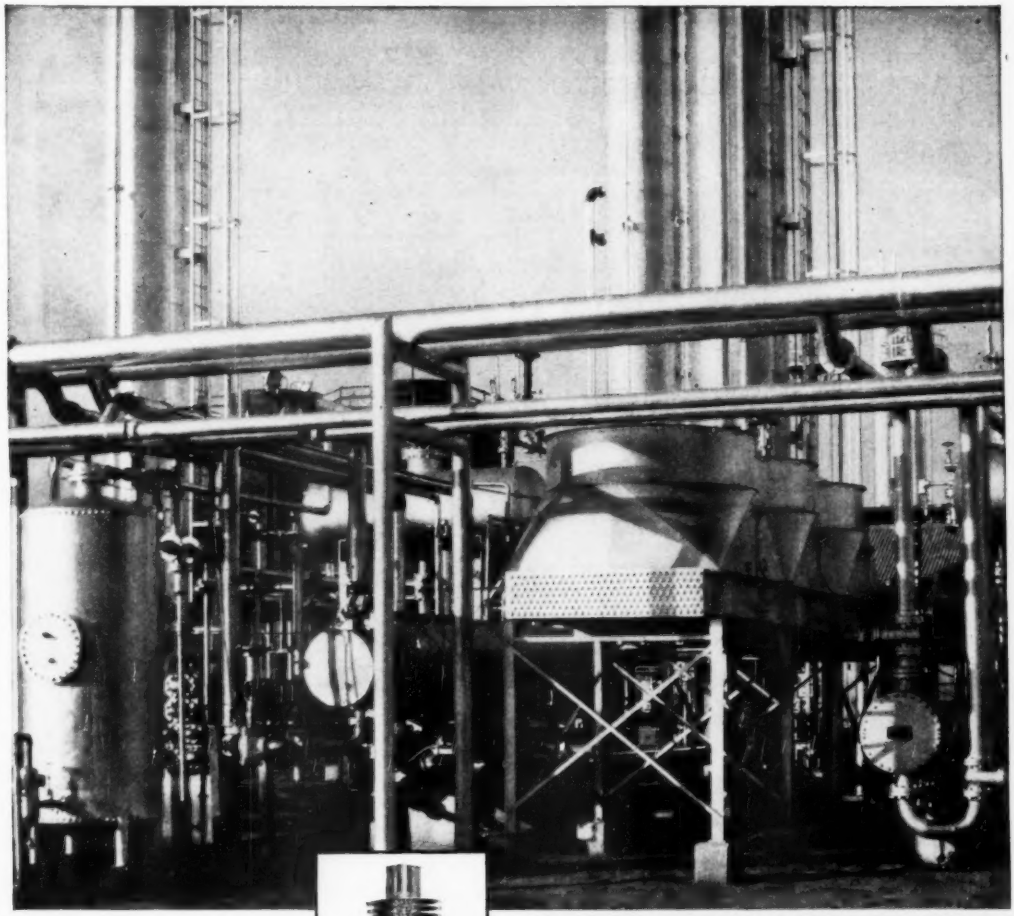
Proved in use in many of the nation's largest gas plants, in pump line stations, in power stations, in diesel locomotives—in many varied applications—Alco exchangers may be the answer to your specific problem.

ADVANTAGES OF ALCO DESIGN

1. Volume production means standardized parts, easy maintenance, low cost per year of operation.
2. Simple field installation of standardized components.
3. Fans may be driven by any form of power.
4. Natural draft construction increases efficiency, reduces power requirements. Sometimes this natural draft is sufficient to produce adequate cooling without use of fans.
5. Wind direction and velocity do not affect efficiency.
6. Cooling surfaces positioned to minimize damage from wind-driven sand, rain, hail.
7. Induced draft insures uniform distribution of air across cooling surfaces.

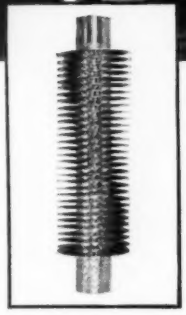
FIN-TUBE MODELS CAN PERFORM MULTIPLE DUTIES

Selection of type of cooling surface to be used should be determined by economics and process requirements. As manufacturers of both radiator core and fin-tube types, and also as one of the world's largest makers of heat exchangers, Alco is in a position to give impartial advice.



ADDITIONAL ADVANTAGES OF FIN-TUBE MODEL

1. Separate surfaces for separate cooling duties can be mounted in the same unit.
2. Header design permits variation of passes to suit process requirements of a given job, thus allowing selection of minimum surface within pressure drop limitation of the process while maintaining maximum velocity required for highest rate of heat transfer.
3. Orifices built into manifold-header design assure uniform distribution to entire cooling surface.
4. Bundle design of Alco fin-tube construction eliminates air leaks.



Quality controls of Alco fin-tube manufacture assure highest heat dissipation rate. Fins wound on under pressure and permanently bonded on tube by means of solder bath completely covering fin and tube. Easy to handle, easy to clean with compressed air.

ALCO

AMERICAN LOCOMOTIVE

HEAT EXCHANGER HEADQUARTERS

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WRITE FOR FREE BOOKLET, just off the press, containing engineering, design, and selection data on Alco air-cooled heat exchangers. Learn how Alco can help you.

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This Simple Compressor Meets the Complex Needs of a Changing Petroleum Industry

It's the Nash!

Here is a compressor presenting advantages found in no other device. Nash Compressors have only one moving part, rotating without metallic contact with the pump casing. No internal lubrication is required. Yet they produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure.

There are no valves, gears, pistons, sliding vanes, or other complicated wearing parts in a Nash. Compression is secured by an entirely different principle of operation. Because of this, gas pumping problems difficult with ordinary pumps are often easily handled by the Nash. For example, Nash Pumps are standard equipment in the Synthetic Rubber Industry, where they have met the needs of new and difficult processes.

Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. They maintain original performance over long periods. Service is assured by a nationwide net-work of Engineering Service offices. Instructive bulletin shows how they operate. Write for it.

One moving part.

No internal wearing parts.

No valves, pistons, or sliding vanes.

No internal lubrication.

Low maintenance.

Slugs of liquid entering pump do no harm.

Non-pulsating pressure.

Saves floor space

75 pounds in a single stage.

NASH ENGINEERING COMPANY

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ONE CALL SERVICE FOR ON-CALL METALS

To supply the specialized needs of the petroleum industry for corrosion-resistant stainless steels and stainless steel products, your Metal Goods warehouse carries a large stock of these essential specialty metals. Many different grades and types can now be furnished from stock—without delay. A few of these are:

***Type 316* for higher corrosion resistance under reducing conditions.**
***Types 321 and 347* for welding applications.**
***Type 410* in strip and sheet for vessel linings.**

Sheets • Plates • Bars • Tubes • Castings • Fittings

We also stock the accessories you'll need to complete your job:
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Types for special applications, although not normally stocked in warehouses, can also be supplied by us at no extra cost.

Metal Goods warehouses are strategically located in the heart of the Midwest and Gulf Coast refining industry — ready to serve you quickly and dependably.

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Plus complete stocks of condenser and heat exchanger tubes... Admiralty... Alclad Aluminum... 70/30 Super-Nickel... Monel.

Tube Sheets... Naval Brass... Muntz Metal

Not Warehoused in Kansas City or St. Louis* **Fittings and Accessories

Consult your Metal Goods metallurgical specialist on the proper metal for your application. *Phone, wire or write your Metal Goods warehouse for your specialized metal needs. Do you have your "Metalog"? It's a complete stock list and metal manual. Write for it!*

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WAUKESHA

180-DACU *Diesel* POWER UNIT

BULLETIN NO. 1410

WAUKESHA MOTOR COMPANY • WAUKESHA, WIS.

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● Get BULLETIN 1410 . . . you'll want to know all about this unusual Diesel power package. Outstanding in its lively pick-up and quick response to power demand—a small four Diesel that's really smooth running and free from vibration. Because of its exclusive and patented combustion chamber, it can burn all "modern high speed Diesel fuels" down to 45 cetane with smoke-free exhaust. Waukesha 180-DACU—$3\frac{5}{16}$-in. x $3\frac{3}{4}$-in., 129 cu. in.—has a maximum continuous rating as a power unit of $22\frac{1}{2}$ hp. at 1800 rpm. It's *the power plant* for small generators, pumps, mixers, portable saws, utility plants on oil rigs; for contractors and builders. *Get Bulletin 1410.*

WAUKESHA MOTOR COMPANY
WAUKESHA, WISCONSIN
NEW YORK • TULSA • LOS ANGELES

Easy, proven way

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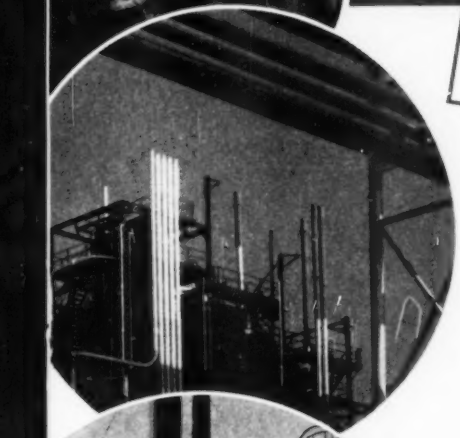

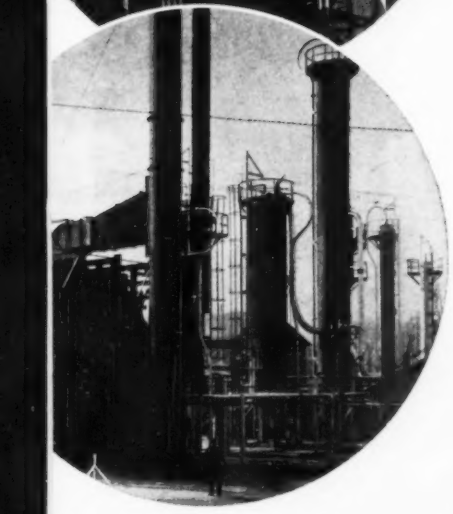

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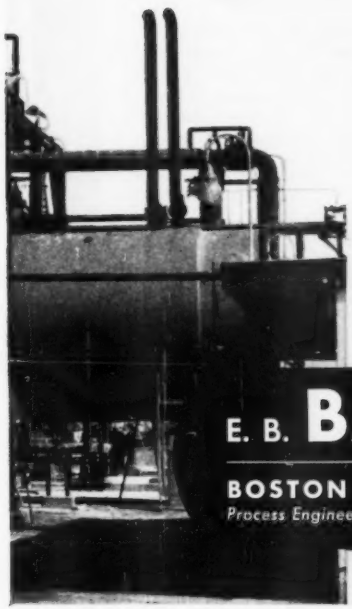

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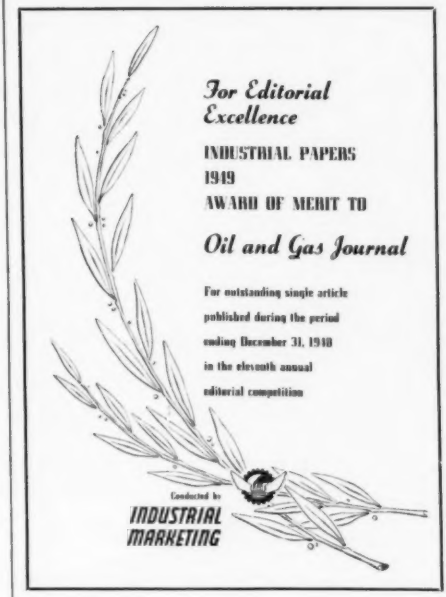

For Editorial Excellence
INDUSTRIAL PAPERS
1949
AWARD OF MERIT TO
Oil and Gas Journal
For outstanding single article published during the period ending December 31, 1948 in the eleventh annual editorial competition
Conducted by
INDUSTRIAL MARKETING

For Editorial Excellence

OUR editors lately have been going around with added glints in their eyes and springs in their steps, mighty pleased about something.

Now they reveal that they had advance knowledge that this week they are being presented with a handsome plaque "for editorial excellence," a reproduction of which we modestly display on this page.

It was awarded by the magazine Industrial Marketing, which every year holds a competition among business and industrial papers and sits in judgment on such features as design and appearance, best single article, best series, best single issue, original research, and kindred objectives of every publisher.

This plaque will go up on our walls along side an array of similar awards won in various categories in previous years, attesting the fact that our favorite oil publication is not just a long shot but can always be counted on to place in the money.

Our award this time was for an "outstanding single article," and was given for the 48-page special multicolor section which we called "Journal-Guide to Modern Refining Processes." It appeared in our annual refining issue, April 1, 1948, and in succinct text and simple flow diagrams it gave in four dozen nutshells the essential facts about as many different manufacturing and treating processes used in modern refineries.

Its purpose was to provide a handy reference for executives, plant operators, and process-design engineers, and also to give an understandable picture of processing to operating personnel regardless of their technical education.

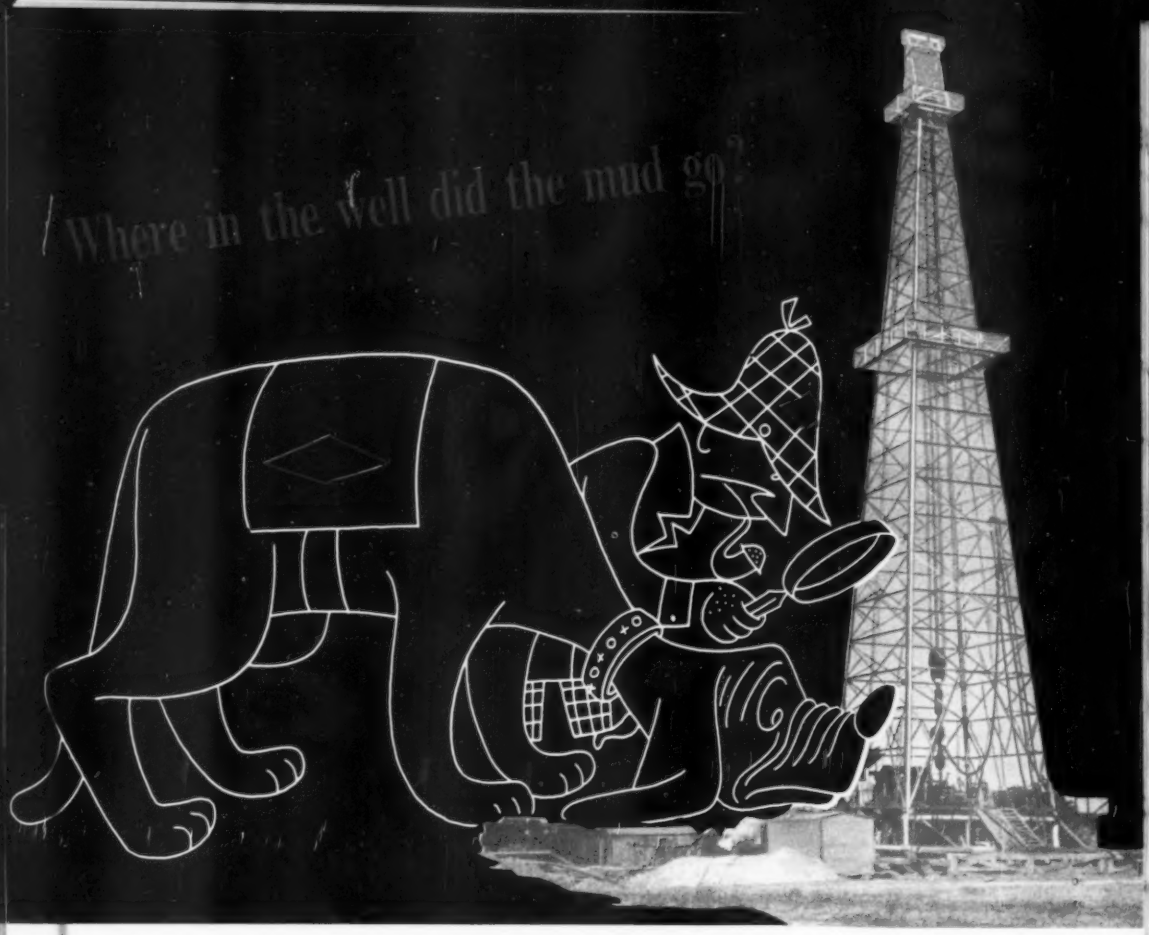
Industrial Marketing wasn't the only one who thought this 48-pager was a pretty neat job. Several hundred of our regular readers wrote in compliments and requests for extra copies.

So we are particularly glad that the contest judges, all non-refinery men, recognized the merit in this package of information, and we add our congratulations to the brains department which put it together.

High, Deep, and Wide

WHEN you open the Journal next week be careful not to lose that folded map of the area which is currently the focus of the entire oil industry—the great Northwest where the mountains are highest, the wells are deepest, and the plains, plays, and prospects are the widest. It's our Rocky Mountain-Western Canada special.

—*Henry D. Ralph*



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The OIL AND GAS JOURNAL

FOUNDED IN 1916 BY PATRICK C. BOYLE

VOL. 48, NO. 6 JUNE 16, 1949

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The strong, simple valve assembly is made entirely without threads and is merely dropped into place by hand. No tools or wrenches are required to install or remove. When an unrestricted passageway is desired, the valve assembly is lifted out, and surveying instruments, or other devices can be run through the drill pipe.

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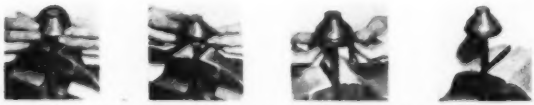
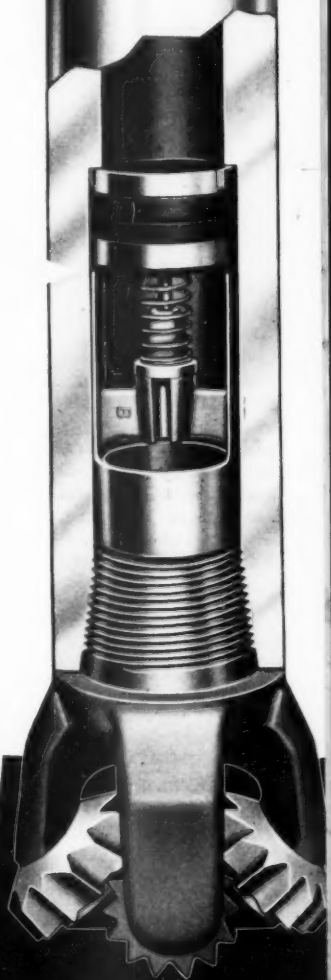


To install new Valve Seal—after long service—in less time than it takes to tell it, you merely (1) press small portion of valve seal down to fit matching groove in valve head; then (2) pull rest of seal parallel to upper edge of groove; (3) pull seal just below groove; press small section at a time into groove. Roll on bench, applying pressure, until the seal fits perfectly as in view (4).



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THE OIL AND GAS JOURNAL

Everybody's Responsibility

IN recent months it has been necessary to reduce petroleum supplies. For the week ending June 4 Texas accounted for 625,825 bbl. daily or 88 per cent of the national reduction of 706,935 bbl. since November. To do this it was necessary for Texas operators to reduce their output 25 per cent.

Lone Star producers and refiners are complaining that they are bearing more than their share of the decreased output and the facts substantiate their contention. For the two periods percentage reductions in other important oil states were: California, 2.6; Illinois, 2; Kansas, 0.8; Mississippi, 15; New Mexico, 0.1; Oklahoma, 3.8; Rocky Mountains, 6.9; and the remaining states 4.5 per cent. Louisiana's production increased 2.7 per cent.

Texas' reductions in crude-oil output has brought curtailment in refinery crude runs to stills in the areas which look to that state for all or part of their crude supplies. Percentage reductions for late May from the peak levels of December were: Texas Inland, 12; Texas Gulf, 16; East Coast, 12; Louisiana Gulf, 13.5. There were no comparable reductions in any of the other major refining groups.

Imports increased steadily last year and were 646,000 bbl. daily in January this year, according to Department of Commerce figures. They decreased more than 100,000 bbl. daily in March but increased to 610,000 bbl. daily in April. Later estimates indicate there have been further increases.

Operators and state conservation bodies in support of what they have done have argued that Texas has had most of the increase in output in recent years and also has the largest flush output. That is true. So what?

Texas output has been curtailed by the Railroad Commission because it realized that national output had expanded in excess of the requirements for the first half of this year. Reduced fuel demands because of the higher-than-normal temperatures last winter and more recently the tendency of wholesale and retail purchasers to stay out of the market as much as possible are factors in the lowered demands. Petroleum consumption is soundly based, and recent reductions in refinery demands are temporary.

In making these temporary adjustments to normal operations it is difficult to see where the duty of one geographical area or one group of operators differs from another. Stripper wells are often exempt from these curtailments because their costs are higher. But operators dependent on marginal production should remember that if surpluses in supply are not corrected and become dominant in market trends they stand to lose more than any other group of operators.

There can be no national agreement involving the individual states. But this does not alter the fact that balancing petroleum supply with needs is everybody's responsibility.

Holman Says Imports not Excessive, Domestic Demands Due to Increase

by Bertram F. Linz

WASHINGTON. — Current curtailment of activity in the domestic oil industry is only temporary and due to the fact that production which went into inventory last year has filled storage capacity, not to imports as believed by independent operators, the House small business committee was told last week by Eugene Holman, president of Standard Oil Co. (N.J.).

Testifying before the committee June 8 at a follow-up on the hearings recently held in Texas, Holman declared it would be unsound and foolhardy to attempt to flood the country with oil imports, even if such a procedure were physically and financially possible, and Jersey Standard, for one, does not want to see imports impair the domestic industry if for no other reason than its own large investments in it which it hopes will retain their value and yield an income.

At the opening of the hearing, Chairman Wright Patman of Texas announced that he proposed also to call for testimony from the military and other government agencies which have an interest in oil, and will explore all phases of the problem.

Patman Is Critical

The Texas hearings, he said, developed that imports have resulted in cutbacks in domestic production and curtailment of exploratory activities, but the committee recognizes that solution of a problem confronting one segment of an industry may prove harmful to the industry as a whole in some cases and intends to get a complete picture before recommending any legislation designed to insure that imports "supplement" but do not "supplant" domestic output.

Holman told the committee that he agrees fully with the oil-policy report of the National Petroleum Council, in the drafting of which he participated, but thinks that when imports are less than exports, as at present, they have not reached the point of supplementing our oil supplies in the national economy and are well within the definitions of this policy.

Holman steadfastly maintained this position under question by the committee's counsel, O. H. Ellis, who repeatedly attempted to secure an admission that the oil imported by Standard could have been provided by domestic producers and therefore "supplanted" domestic oil.

Pointing out that 4.9 per cent of domestic production last year went into inventory, which he said many producers probably did not realize, and another 2.1 per cent was exported, Holman said that domestic production accordingly exceeded domestic consumption by 7 per cent. "So when storage tanks became full and production had to be cut back it came as a shock to many," he commented.

Holman took the view that the present situation, where domestic production is 12 per cent below last December's peak, is probably only a temporary condition and it is likely it will soon have to be stepped up. This will be inevitable if the estimate of 6,515,000 bbl. daily demand for the last 6 months of this year, made by the supply and demand committee of the Independent Petroleum Association of America, is accurate.

Says Output Will Jump

"While this estimate may well be overoptimistic, it seems obvious that the present supply level is temporarily low and must increase in the near future." he said. "If we assume that imports will continue to average only 500,000 bbl. daily and if demand should turn out to be as high as this estimate, domestic production, including natural-gas liquids, must jump to 6,000,000 bbl. daily to balance the average demands immediately ahead —a period which does not include the heavy consumption of the winter months. This would be 98 per cent of the maximum production ever achieved in this country."

But the I.P.A.A. estimate of fourth-quarter demand of 6,830,000 bbl. daily would require even greater production—6,330,000 bbl. daily if imports were not decreased, or 3.5 per cent more than the maximum output ever achieved in the past, althought a part of such demand could probably be supplied from accumulated stocks.

It cost Standard a lot of money to develop the import movement which is now tapering off—money that could have been saved had it been known that last winter would be one of the warmest on record—and the contracts it made for foreign oil will not be worked out until the middle of the year, Holman said.

The company took steps to curtail imports as soon as the situation became clear, and it has consistently attempted to operate within the limits of the NPC oil policy, as has the industry as a whole. Standard imports were reduced from 252,500 bbl. daily in January to 160,600 bbl. daily in March, and while they increased over the following 2 months to 215,600 bbl. daily in May it is estimated they will decline to 186,100 bbl. daily this month.

"We are sure that the domestic industry is vigorous and healthy," Holman declared. "We think that exploration and development work will and must continue at a high level if domestic capacity is to keep up with increasing domestic consumption. We consider that imports brought in either for direct export or to replace equivalent amounts of oil shipped out of the country are desirable and healthy if the movements can be made competitively with domestic supplies. Further, we think that imports of special crudes and products to supplement limited domestic availability of certain grades is in the interest of our national economy."

Proposals for government restrictions on imports "appear to rest principally on fear of the future" he told the committee. Most of this fear is centered on the Middle East. But there are some physical and economic factors which, in themselves, make future floods of foreign oil extremely unlikely as far as can be foreseen at present," he commented.

Middle East Called No Threat

"The existing productive capacity of the Middle East is considerably less than will be required to supply Eastern Hemisphere refineries now existing and under construction," he explained. "Therefore, large capital expenditures will be required for development of productive capacity in the Middle East—even if none of this oil comes to the United States. To provide floods of this oil for United States imports would require still more expenditures of capital. Any intelligent investor will ask himself several questions before risking huge sums.

"Our analysis of these investment factors have led us to the conclusion that investments for the purpose of permanently supplying the domestic market from the Middle East are not presently attractive, relative to other uses for this capital. Other investors of course, may look at it differently.

"However, while I cannot predict

(Coninued on page 190)

Scouts Told Pipe Line Needed To Sustain Canadian Activity

by Leigh S. McCaslin, Jr.

HOUSTON.—"Immediate serious consideration" of a pipe line from the newly discovered reserves in Alberta, Canada, to the Pacific Coast was called for here last week by T. A. Link, noted Canadian consulting geologist.

Calling such a line vital to the security of North America, Link said "for defense purposes, in case of war in the Pacific, a pipe line to the coast would obviate the necessity of a repetition of another Canol project orgy, and the same applies to a natural-gas pipe line to that same area from Alberta."

With daily production in Alberta now running around 50,000 bbl. "people are beginning to wonder about the disposal of this oil, and the wisdom of looking for more with no immediate market in sight for excess." Link estimated that 60,000 bbl. daily production would saturate the immediate prairie provinces market.

Wildcatting to Continue

In his address, which was a highlight of the annual convention of the National Oil Scouts and Landmen's Association, the Canadian geologist discussed the pipe-line problem in considerable detail. Decelerated addition to reserves in California was given as a factor favoring a line to the Pacific Coast. Oil reserves in Alberta are adequate to support the proposed pipe line for more than 20 years, Link said. This is in addition to supplying the 16-in. line now being built by Imperial Oil, Ltd., to Regina, Sask.

If such a pipe line proves economical and feasible, wildcatting will be greatly encouraged and the present boom will not die out because of lack of markets. Ultimate consideration should be given to extending the Edmonton-Regina pipe line to the head of the Great Lakes and on to the Minneapolis and Chicago areas, Link asserted. However, "before such a proposition is taken too seriously the present known reserves must be increased, and therefore there should be no letup in wildcatting activities even though proration and price reductions are imposed more stringent than now."

Because of the security or defense angle, Link recommended that a joint Canadian-American board be set up to handle oil production and distribution. He added that "both major companies and independent operators should share in this business which should be conducted so as to be above criticism from socialistic and communistic political bombardments."

Link told his listeners that all new fields in Alberta are prorated and further slight price reductions and voluntary proration are expected. He gave this word picture of current activity in the province:

There are 12 or more major oil companies exploring in Alberta today, and about 10 companies which might be classed as semimajor or potential majors, while minor independents number about 50 without counting individual operators. There will be a minimum of 14 surface geological parties for various companies surveying in Alberta this summer season; 51 seismic parties and 11 gravity meter parties were operating as of May 1, 1949, and these will be increased during the summer months. Forty-one wildcat wells were being drilled as of that same date, but this number has already been increased. Some 56 exploitation or development wells were drilling as of May 1, and more than 35 million acres of leases and prospecting permits are held by various companies and individuals in Alberta. This does not include fee-simple and railway lands. The daily production from Alberta fields is about 50,000 bbl. of which more than 70 per cent comes from the newly discovered pools.

The geologist told his Texas audience that Alberta contains more oil than the Lone Star state and probably more than the entire United States if the tar sands of Athabaska are included. Prior to the Leduc discovery in February 1947 the total proven reserves for all of Canada were estimated at 200 million barrels, however since that time more than 750 million barrels have been added to that figure.

From a geological standpoint, Link gave this summary of the Alberta boom:

Oil and gas have been encountered in the Cambrian and possibly the Ordovician; none in the Silurian; the greatest developed reserves are from the Devonian; a considerable amount from the Mississippian; none in the Pennsylvanian and Permian; shows of oil in the Triassic; small oil and gas fields from the Jurassic; heavy oil, including the tar sands, and considerable gas from the Lower Cretaceous; and large and small gas fields from the Upper Cretaceous. Of these, the Upper Devonian holds the greatest promise, but it seems probable that additional large heavy-oil and gas pools will be found within the Lower Cretaceous incidental to the search lower down in the Paleozoics.

Anderson Also Speaks

R. B. Anderson, president of the Texas Mid-Continent Oil and Gas Association, was another featured speaker at the 3-day meeting which had a total registration of 498. Anderson urged his listeners to give thought to solving the problem of distribution of goods among the nations of the world, which problem he described as "the greatest unanswered economic difficulty of our generation."

The Texan said that American industry must find a means of distributing the goods it makes. A medium of exchange other than gold might be the answer, he stated, while describing our present monetary system as inadequate. Whatever the answer, "we who believe in a free competitive system of economy for this nation, must give our thinking and our effort toward solving this distribution problem of our generation within free competitive bounds."

A discussion of offshore drilling

Shown immediately after their election in Houston are the new officers of the National Oil Scouts and Landmen's Association: Fred S. Alexander, Standard Oil Co. of Texas, Amarillo, editor-in-chief; Frank Fagan, Atlantic Refining Co., Wichita, third vice president; Fred Tyner, Pure Oil Co., Roswell, N. M., first vice president; S. N. Jackson, Sun Oil Co., Dallas, president; Chester H. Geiger, Carter Oil Co., Mattoon, Ill., secretary-treasurer; and George Saverline, Sun Oil Co., Shawnee, Okla., second vice president

and development in which he emphasized that the major problems stem from the elements was presented by Mercer H. Parks, Humble Oil & Refining Co. petroleum engineer. The scouts and landmen were welcomed to Texas by Lieut.-Gov. Allan Shivers and Houston's mayor pro tem Tom Needham.

Newly elected officers of the group are: S. N. Jackson, Sun Oil Co., Dallas, president; Fred Tyner, Pure Oil Co., Roswell, N. M., first vice president; George Saverline, Sun Oil Co., Shawnee, Okla., second vice president; Frank Fagan, Atlantic Refining Co., Wichita, third vice president; Chester H. Geiger, Carter Oil Co., Mattoon, Ill., secretary-treasurer; and Fred S. Alexander, Standard Oil Co. of Texas, Amarillo, editor-in-chief.

The 1950 national convention of the association will be held in Oklahoma City.

Wyoming Wildcat Exceeds 20,000-Ft. Mark and Is Still Drilling Ahead

DRILLING to 20,000 ft.—a goal long sought by the oil industry—has been achieved by Superior Oil Co. in its Pacific Creek wildcat in southwestern Wyoming.

Already the world's deepest well, it hit the 20,000-ft. mark on May 30, and on June 13 was still drilling below 20,420 ft.

This is the third successive record breaker for Superior. Early this year, on February 14, the old depth record of 17,823 ft., also set by Superior, in 51-11 Weller in Caddo County, Oklahoma, was broken by Superior's 1 Limoneira in Ventura County, California. This was a record deep hole at 18,739 ft. when it was abandoned dry on March 13. The mark did not stand long, however, since it was broken in April by the Pacific Creek well.

A record-length casing string was set in this deepest well—19,765 ft. of 7-in. casing, cemented on May 14. Record-size equipment is also being used for drilling. *(An engineering story on drilling this deep well will appear in next week's special Rocky Mountain-Western Canada issue of The Oil and Gas Journal.)*

The Pacific Creek wildcat was spudded by a contract rig on July 13, 1947, and suspended at 9,881 ft. on November 9, 1947. The well is now being drilled by Superior tools, the rig being the largest of its kind in the world. Rig time to date, including the suspended period, has been 443 days, and from the beginning of operations at 9,881 ft. to present, 324 days of rig time have elapsed.

Today's deep wildcats, made necessary by the increased demand for liquid fuels, and consequently increased reserves, are a far cry from the first well drilled expressly for oil 90 years ago. This first well was 69½ ft. in depth. The first 10,000-ft. well drilled in California in 1931, some 72 years later, was hailed as a great achievement, and it was at the time. That depth has now been doubled in about 18 years.

Twenty years ago the record well was 9,280 ft. deep, the record being made in Shell Oil Co. 1 Nesa at Long Beach, California. Ten years later, in 1939, the deepest well was Continental Oil Co. KCL A-2 Wasco, in Kern County, California, drilled to 15,004 ft. The new record holder has added more than 5,000 ft. to this record.

NPC Sets "Important" Meeting for July 28

WASHINGTON.—National Petroleum Council Chairman Walter S. Hallanan this week set July 28 as the date for the next council meeting, at which he said "developments of vital interest" will be considered.

Hallanan reported that a council committee which met last week to consider nominations for the post of director of the Oil and Gas Division "has agreed upon several names" to be submitted to Secretary of the Interior J. A. Krug. In view of the fact that it is not known whether any of the nominees would accept the appointment, if tendered, the names were not disclosed.

SOCal Guilty Though Dealers Not Harmed

WASHINGTON. — The Supreme Court June 13 spoke the last word in the government suit to outlaw the use of exclusive dealer contracts by Standard Oil Co. of California and its subsidiary, Standard Stations, Inc.

By a split vote, the court affirmed a lower court decision holding the companies in violation of the antitrust laws in their dealings with service stations in seven western states.

The suit revolved around agreements allegedly demanded of service stations by the defendant companies that the former would handle Standard products exclusively.

Although the court's decision applied only to filling-station contracts, some lawyers took the view that it might open the way for government action against other industries which also seek to hold independent distributors to arrangements under which retailers agree to handle only the products of one firm.

Another oil suit was brought before the court last week when Standard Oil Co. (Ind.) filed an appeal from a circuit court decision that a reduction of prices made in good faith to meet the equally low price of a competitor is not an absolute defense against charges of discrimination in violation of the Robinson-Patman Act.

Company Issues Statement

In San Francisco, Standard Oil Co. of California issued the following statement:

"The Supreme Court ruled today that our dealer contracts constitute a violation of Section 3 of the Clayton Act, although it did not sustain the ruling of the lower court that a violation of the Sherman antitrust law was involved.

"The court did not find that Standard in fact restricted or reduced competition, or that these dealer contracts have been in any way detrimental to the public. On the contrary, the court states that our dealer contracts may well be of advantage to the dealers and the consuming public as well.

"These contracts have been in open use for many years by our company and numerous competitors without question as to their legality, and business in general has always assumed, until this 5-to-4 decision, that for a contract to be illegal it must be established that the contract in some way restricts competition.

"We believe that, as said by one of the dissenting judges, it was 'indispensable to the Government's case to establish that either the actual or the probable effect of the accused arrangement is to substantially lessen competition or tend to create monopoly.' This the Government admittedly has not done."

Pressure Maintenance for Old Ocean Field Is Sought

AUSTIN. — J. S. Abercrombie Co. has applied for a permit for a pressure-maintenance program for the huge Old Ocean field of Brazoria and Matagorda counties, Texas. Hearing before the Railroad Commission has been set for July 7.

A similar request has been received by the Railroad Commission for the Kadane field, Archer County, and hearing has been set for July 7. Applicants are K & G Production Co., G. E. Kadane et al, who want to use gas in the Cisco Dyson sand and water in the Pennsylvanian Strawn.

this week

IMPORT-EXPORT—Eugene Holman tells congressional committee that imports are not excessive now. . . . No danger of flood of foreign oil. . . . Middle East no permanent threat. . . . Domestic demand certain to increase. . . . ¶Economic Cooperation Administration trims estimates of Europe's oil imports. . . . Makes new long-range study of world oil trade under ERP. . . .

TIDELANDS—New administration bill claims full rights to offshore oil. . . . Ignores current efforts toward compromise with state claims. . . . Seeks support from other states by disclaimer as to inland waters. . . . ¶Five Louisiana operators sue to suspend their obligations on offshore leases pending settlement of federal-state dispute. . . .

ANTITRUST—In perplexing split decision, Supreme Court holds Standard of California in violation of antitrust law in exclusive-dealer contracts though admitting dealers not injured and competition not curtailed. . . . ¶Standard of Indiana appeals decision denying it right to cut prices in good faith to meet competition. . . . ¶Prospects look good for passage of legislation to stop Federal Trade Commission from outlawing basing-point prices. . . .

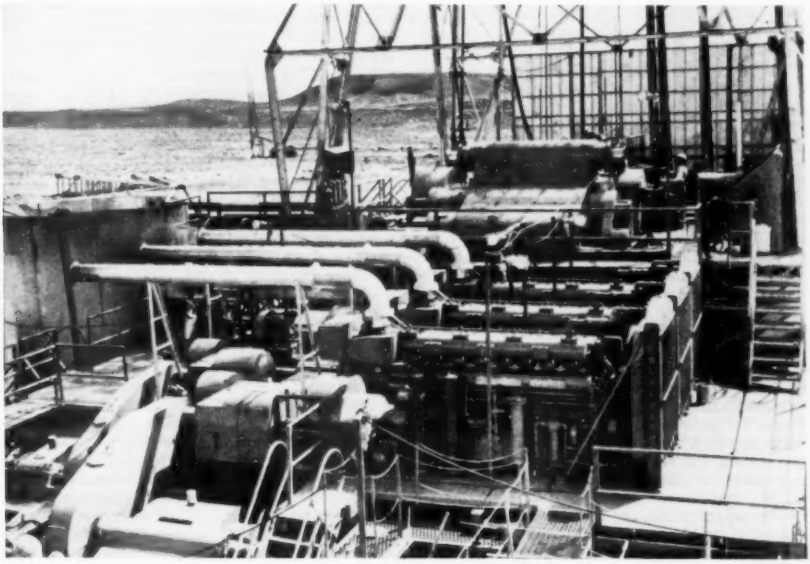
TRENDS—Gasoline deliveries from refineries and bulk terminals for week ended June 4 reached a peak of 2,828,000 bbl. daily. . . . ¶Gasoline stocks declined 1,555,000 bbl. for the week. . . . If gasoline inventories are to reach the 1948 level by the end of August, reductions must average about 2,000,000 bbl. per week. . . . Stock withdrawals since end of March amount to 8,300,000 bbl. . . . Oklahoma-Kansas and Illinois-Indiana districts with 34 per cent of gasoline stocks accounted for 57 per cent of decrease. . . . East Coast inventories are greater than at the end of March. . . .

INTERNATIONAL—Italians shelve amendments to mining law which would open country to large-scale exploratory work by foreign capital. . . . ¶United States protests British-Argentine trade agreement under which Great Britain will supply Argentina's oil needs. . . . ¶Oil study of Venezuela prepared by Joseph E. Pogue indicates trend of production costs must be reversed or Venezuela's oil will be in a poor competitive position with that of other areas. . . . Action precluding granting of new concessions termed restrictive to industry. . . .

NATURAL GAS—Renomination of Olds following confirmation of Buchanan means FPC will have majority favoring strict control of natural gas. . . . But Congress may counterbalance this by putting statutory limitations on FPC's authority over field prices, production, and gathering. . . .

PIPE LINES—Survey is under way on 450-mile Edmonton-Regina Interprovincial crude-oil line. . . . ¶Tennessee Gas Transmission Co. laying 200 miles of loops. . . . ¶Export licenses for shipment of 47,500 tons of 30-31-in. pipe for Trans-Arabian line approved. . . .

REFINING—Tariff Commission report shows production of GR-S synthetic rubber declined in 1948. . . . ¶Work is being completed on British American's Montreal East refinery. . . . ¶Shell official says refinery capacity must be expanded to meet future needs. . . . ¶Esso Standard Oil Co. lays off 400 employes at Baton Rouge plant. . . .



Power to drill 4 miles. View of the floor of the derrick of the Pacific Creek wildcat, now drilling below 20,000 ft., showing the three supercharged, dual-fuel diesels which develop a total of 2,010 hp. See story on opposite page

New Administration Tidelands Bill Ignores Compromise Talk

WASHINGTON. — The administration last week sent to Congress a draft of legislation defining the tidelands to which the Government claims paramount rights, as conferred upon it in the Supreme Court's decision in the California case.

The measure, identical with that introduced in 1948 by then Sen. Alben W. Barkley of Kentucky, was sent to the Capitol by Secretary of Defense Louis Johnson, Attorney General Tom Clark, and Interior Secretary J. A. Krug.

Spokesmen for the three officials emphasized that the proposed bill was not intended as an answer to the proposals made by the state attorneys general for a compromise to the tidelands issue, and said that it was initiated in the Department of Justice some time ago, was approved by Krug at St. Louis last month, and was held up only because of delay in review in the National Military Establishment.

Inasmuch as it has been known for some time that the state officials were seeking a compromise, however, the bill was taken in many circles to represent the administration's position on a tidelands compromise—a rather definite rejection of any idea that the Government will give up anything it now possesses as a result of the California decision or anticipates possession when the Supreme Court rules on the cases against Texas and Louisiana.

Inland Waters Exempted

In an explanatory statement accompanying the bill, the three cabinet members point out that the decision in the California case that the United States has paramount rights in, and full dominion and power over, the lands, minerals, and other things underlying the Pacific Ocean adjacent to the state seaward of the ordinary low-water market and outside of inland waters "has given rise to considerable concern as to similar rights to inland navigable waters." The legislation, it was stated, "is designed to allay these apprehensions."

Accordingly, Congress was told, the bill releases and relinquishes to the several states and their grantees all right, title, and interest of the United States, "if any it has," to all lands beneath navigable inland waters other than those in which the United States may have acquired any interest by treaty, purchase, condemnation, or otherwise by virtue of arrangements unrelated to the doctrine enunciated in the California case. This exemption would apply to bays, rivers, ports, and harbors which are landward of the open sea, as well as the area covered and uncovered by the tides; and lands beneath navigable inland waters filled in or reclaimed.

The measure also affirms the rights of states and their political subdivisions, municipalities, agencies, or persons which they may have held prior to June 23, 1947, the date of the California decision, to construct, maintain, use, or occupy any dock, pier, wharf, jetty, or other structure in submerged coastal lands.

It is stipulated, however, that rights to structures shall not include any right "with respect to oil, gas, or other minerals in submerged coastal lands; or as confirming or recognizing any interest in submerged coastal lands other than that essential to the right to construct, maintain, use and occupy" the structures enumerated above or to the use and occupance of the surface of filled-in or reclaimed land.

Oil Structures Covered

The structures enumerated, it is further provided, are not to be construed as including "derricks, wells, or other installations in submerged coastal lands employed in the exploration, development, extraction, and production of oil and gas or other minerals." It was explained it is felt the disposition of such structures should depend upon the disposition of oil and gas leases in the submerged coastal lands and provision for such leases is made in the proposed bill providing for federal administration of the lands.

The preamble of the bill points out that the Supreme Court, before the California decision, had held that the states own the beds of inland navigable waters within their boundaries, and that the attorney general has repeatedly stated that the United States makes no claim to such lands.

"Despite the reiteration of this disavowal with respect to title to lands beneath inland navigable waters, some concern has been expressed that such claim might nevertheless be made," it was stated.

"There is no intention to claim, on behalf of the United States, title to any lands beneath inland navigable waters; and it is in the public interest that additional assurance be given by the Congress that the United States does not claim title to lands beneath inland navigable waters."

The states' proposal for a compromise still is before the attorney general and secretary of the Interior for review. That proposal reportedly calls for an acknowledgment by the Government of the states' ownership of their submerged lands, generally to a distance of 3 miles but in the case of Texas 10½ miles seaward of the low-water mark, within which the federal Government would hold "paramount right" but the state governments would exercise actual control over leases, with respect to police power and with respect to revenues. The states would turn 37½ per cent of the revenue from their areas over to the federal Government and the latter, in turn, would give them a similar proportion of revenue from operations beyond the state boundaries. A definite assurance would be called for that the federal Government will not attempt to invade the inland waters of the states.

Legislative action on the proposal has been held up pending an agreement between the states and federal officials.

Esso Standard Cuts Crude Purchases in Three States

Esso Standard Oil Co. last week cut its crude-oil field runs and purchases 40 per cent in Louisiana, Mississippi, and Arkansas.

The Arkansas Oil and Gas Commission immediately issued an emergency order reducing that state's crude-oil allowable by 10,000 bbl. daily—a 15 per cent cutback for all controlled pools.

Esso's reduction amounted to a cut of about 41,000 bbl. daily. The company takes about 40 per cent of the field runs in the three-state area.

Esso officials attributed the cut to slow movement of distillate fuels from the Baton Rouge refinery and to the fact that tankage for distillates is filled.

Southern Louisiana Crude Price Levels Off at $2.75

Price cuts by Gulf Refining Co. and Tide Water Associated Oil Co. last week leveled off the top posted price for southern Louisiana oil at $2.75 a barrel for 40°-gravity crude.

Gulf announced a 13-cent cut in six fields, bringing the company's prices in line with those of other companies buying similar crude in other fields in the area.

Tide Water announced a 3-cent reduction in its posting for Venice field, Plaquemines Parish, which produces a crude similar to that in the six fields where Gulf buys.

The six fields affected by Gulf's announcement are Bayou Cuba, St. Charles Parish; Bully Camp and Timbalier Bay, Lafourche Parish; and Grand Bay, West Bay, and Quarantine Bay, Plaquemines Parish.

FPC Nominations May Be Offset By Action on Natural-Gas Bill

WASHINGTON.—Nomination of Leland S. Olds for another 5-year term as a member of the Federal Power Commission was sent to Congress last week by President Truman. Olds' present term expires June 22.

The gossip around the Capitol was to the effect that the Senate would confirm Olds, as it recently confirmed Thomas C. Buchanan after holding his nomination up for many months, and Congress then would pass legislation exempting independent producers and gatherers of natural gas from Power Commission control. Both Olds and Buchanan have opposed such legislation, contending that, while the FPC has never sought to regulate the independent producers and gatherers, it nevertheless should not be deprived of the authority to do so should occasion arise.

The natural-gas legislation was under consideration on both sides of the Capitol last week. The House interstate commerce subcommittee handling the matter held a couple of executive sessions, at one of which it questioned Olds further, and the corresponding Senate subcommittee wound up its hearings on the Kerr bill.

Hearings Are Ended

Final witnesses to appear before the subcommittee June 10 were Miss Anne X. Alpern, Pittsburgh city solicitor, and C. Huffman Lewis, counsel for Union Producing Co., Shreveport, La.

Miss Alpern flatly opposed the bill on behalf of both the city of Pittsburgh and the National Institute of Municipal Law Officers, of which she is a past president and present trustee, on the ground that 40,000,000 consumers throughout the country would be adversely affected.

She declared that higher prices for gas would be inevitable if sales are removed from FPC control and asserted that gas companies in Pittsburgh currently have applications pending for increases in rates.

Miss Alpern charged that the interests behind the bill are not the really small producers but a few large holders of gas reserves, and said the fears of the small producers that the commission would regulate them are a "figment of the imagination."

"The ones really in back of the bill are the large producers who dominate the field and who could, if the bill was passed, procure extortionate profits from the consumers," she said.

Lewis declared his company does not object to the basic principles of the bill, provided they are expanded so as to put all producers of natural gas on equal terms "and thus eliminate inequity and illegality."

As it is now written, however, he warned, the bill is unconstitutional because it is class legislation that would favor one group against another.

The result of the bill as now written, he contended, would be to set up two prices for natural gas, one the price which the unregulated producer and gatherer could charge, the other, possibly as little as half as much, that the regulated producer could procure. In some instances this would mean that royalty owners would receive two prices from wells in separate fields, in others different owners would receive different prices from wells in the same field, and in still others the owner of a single well might get two prices for his gas if he sells to both intrastate and interstate buyers, Lewis explained.

Equal Treatment Asked

"A very, very serious question of constitutional law is involved here," Lewis said. "The proposed legislation in its present form cannot meet the constitutional requirement of equality and justice for all in the same general class or occupation."

"The business of drilling for and producing natural gas is essentially a private business," Lewis told the subcommittee. "Contracts for the sale of the products of this business are private property rights. They should not be subjected to governmental regulation where the purpose of that regulation is merely to pass on to the consumer a bonus in the form of a reduced price at the expense of the producer. Any gas producer who has assumed the many hazards and risk of such a highly speculative enterprise in order that he may earn a profit from an honest sale from the fruits of his labor ought to possess the same rights and privileges of free enterprise as a producer of oil or coal or any other commodity. The arbitrary taking of any part of the price of his product for the profit of an ultimate consumer is an unwarranted deprival of a valuable property right. And the right of property is the cornerstone of the Constitution."

Lewis contended that if the public interest does not require regulation or price control where gas is sold by an independent producer, it is unreasonable and discriminatory to impose price control on affiliated producers by any other yardstick than that which measures the price fixed by independent sellers — the market price prevailing in the field.

He urged that the bill be amended to provide exemption from FPC control for all production and gathering facilities, and not only to sales of gas at arm's length but to all other sales "at a price not in excess of the average price provided in arm's-length contracts in the same field or area."

Lewis asked for another amendment under which, in regulating the rates and charges of a company which produces some or all of its natural-gas supply, the commission would be required to treat the production and gathering operations in the same manner as though they were being carried on by a company not subject to FPC jurisdiction, and to exclude such facilities from its rate base and allow as an operating expense the value of its produced gas as a commodity in the field or area where it is produced.

Bill Would Tax Co-ops, Government Enterprises

WASHINGTON.—Legislation which would raise a revenue of $1,080,000,000 a year from cooperatives and other organizations now exempt from income taxes was introduced in Congress last week by Rep. Noah M. Mason of Illinois.

The bill represented the first direct move to eliminate the tax advantages of the cooperatives taken since congressional committees first interested themselves in the subject some 5 years ago.

The closing of the loopholes by which cooperatives and other tax-free businesses which compete with private enterprise escape taxation would go far toward meeting the deficit which financial experts now expect the Treasury to encounter next year, the congressman said.

Mason estimated the income taxes on cooperatives and other similar organizations would return $626,000,000 a year, while $14,000,000 could be secured through taxes on unions, $173,000,000 from "altruistic organizations" and $267,000,000 from government-owned enterprises which compete with private business.

Mason pointed out that in recent years the cooperatives have bought up many prosperous taxpaying refineries, factories, and other facilities and have "taken them off the tax rolls to the dismay of the Bureau of Internal Revenue."

The "altruistic organizations" which Mason would tax include the so-called charitable trusts which recent senatorial investigation showed are frequently set up for the purpose of receiving income and passing it on, tax free, to parent companies.

1949 Will See $2,000,000,000 Spent for New Oil Facilities

FOR the third successive year the American oil industry is spending two billion dollars in expanding and modernizing its facilities, according to results of a questionnaire just compiled by the American Petroleum Institute.

Replies received to date, said to represent a substantial portion of the industry, show that a total of $2,146,206,000 has been earmarked for 1949 program. This is only slightly under the 1948 expenditure of $2,355,033,000, and compares with $1,878,147,000 spent for expansion in 1947.

As in previous years, approximately half of the total outlay will go for drilling and production facilities, and another sizable portion for intangible expenses in developing prospective oil fields when costs are not capitalized and to cover losses sustained in drilling dry holes. Funds being spent this year for refining and transportation facilities are only slightly under the 1948 figures and are substantially higher than 1947 expenditures for these divisions.

The following table is a summary of the replies tabulated by the A.P.I.:

(In thousands of dollars)

	Production	Refining	Transportation	Marketing	Intangible development	Other	Total
1947	897,385	397,195	275,771	269,372	99,775	38,424	1,878,147
1948	1,223,320	588,012	264,273	209,078	135,485	70,350	2,355,033
1949	1,134,784	524,797	201,019	232,145	119,119	53,461	2,146,206

Offshore Lease Suspension Sought

HOUSTON. — The federal government-state fight over the tidelands was further complicated this week with five major oil companies suing the State of Louisiana to be relieved of their offshore lease obligations until the dispute is settled.

The five companies—The Texas Co., Humble Oil & Refining Co., Stanolind Oil & Gas Co., Magnolia Petroleum Co., and Shell Oil Co., Inc.—filed suits in Baton Rouge district court against the Louisiana State Mineral Board. About 40 per cent of the total Louisiana offshore lease holdings is represented by the five concerns. About 930,000 acres, for which bonuses totaling around $9,500,000 were paid, are involved.

If successful, the suit would relieve the companies from paying annual rentals to hold their leases. Also, their rights under the leases would be suspended. The lease contracts stipulate that annual rentals equivalent to one-half the bonus must be paid if wells are not drilled. Some of the leases in question are now held by drilling, but about $2,000,000 in rentals is being paid by the five companies.

C. J. Bonnecarrere, secretary of the state mineral board, is reported to believe that the suits seem to indicate that the companies plan to suspend further development while the litigation between the United States and Louisiana is under way. With the exception of The Texas Co., the five concerns involved have been among the most active in offshore drilling and exploration. Magnolia has drilled or is drilling 14 wells, Humble 21 wells, Stanolind 2 wells, and Shell 4 wells. The companies have brought in eight producers among them.

Some quarters speculated that the timing of the suit was poor, from Louisiana's standpoint, because of the current talk of compromise on the tidelands fight. However, highly placed officials in the companies involved declared that it was not the intent of the suit to weaken the position of Louisiana and Texas.

Munitions Board Demotes Its Petroleum Advisers

WASHINGTON. — The Munitions Board last week issued orders formally assigning the position to be occupied by its newly acquired petroleum committee, formerly the Armed Services Petroleum Board.

Whereas the ASPB in the past could meet the Munitions Board on terms of equality, as a petroleum committee will not even report to the board directly but through the director for military programs.

The committee will consist of six members, two each of the three departments—Army, Navy, and Air Force—and will select a chairman annually from its membership on a rotation basis among the departments. Its organization will include a permanent secretariat, headed by an executive secretary of general or flag rank.

At the outset, the membership of the former board will serve on the new committee, as follows: Lt. Gen. T. B. Larkin, Army, chairman; Lt. Gen. J. A. Craig, Air Force; Vice Adm. R. B. Carney, Navy; Rear Adm. Edwin D. Foster, Navy; Maj. Gen. Herman Feldman, Army, and Brig. Gen. W. E. Farthing, Air Force. Rear Adm. B. B. Biggs will be executive secretary, with Col. W. J. Worcester, Air Force, and Lt. Col. Merton Singer, Army, as deputy executive secretaries.

Next Week

SPECIAL ISSUE ON ROCKY MOUNTAIN-WESTERN CANADA OIL

Next week will see an entire special issue devoted to these two great side-by-side areas, the "new frontier" for oil and gas on the North American continent.

The Rocky Mountain area extends from the San Juan basin on the south to the Canadian line on the north, a distance of over 800 miles.

The Western Canada basin includes the southwest quarter of Manitoba, southern two-thirds of Saskatchewan, practically all of Alberta, northeast corner of British Columbia, and extends through the Northwest Territories to the Arctic Ocean—an area larger than the five largest U. S. oil-producing states combined. And this entire basin is potentially oil productive.

Articles on area.—Members of the Journal's editorial staff gathered data on the spot at rigs, wells, and refineries scattered over this vast territory. Itinerary of the survey trips of the Journal men included Denver, Colo.; Casper, Rock Springs, Lander and Worland, Wyo.; Billings, Mont.; Calgary and Edmonton, Alta., and Regina, Sask. Cooperating in the editorial projects have been independent operators, engineers, geologists, oil-company executives, and government officials. Many other authors and technical experts in this rapidly growing oil territory also have contributed material on different industry phases for this special issue.

Multicolor insert map of Rocky Mountain-Western Canada.—One of the Journal's large folded insert maps will accompany the issue, giving complete listing and location of all oil and gas fields, oil pipe lines, gas pipe lines, refineries, and natural-gasoline plants.

PERSONALS

Baxter, S.G.A. President, Has Wide Experience

ELECTION of L. L. Baxter as head of the Southern Gas Association at its forty-first annual meeting in Biloxi, Miss., in April assured the organization a president who has wide experience in the natural-gas industry, and who is thoroughly familiar with operational problems facing the business.

Baxter, as president of Arkansas Western Gas Co., Fayetteville, has been instrumental in developing the natural-gas industry in the Northwest Arkansas territory. He first became active in the gas business when he joined Arkansas Western as district manager in 1932. In 1932 Baxter was elected vice president of the company, and in 1943 he assumed duties as its president.

Not only has he had wide experience in the gas field, but his knowledge of the operation of Southern Gas Association will also be advantageous. He served as the association's secretary for 6 years, and last year was elected vice president. The association is comprised of memberships from 13 southern states, and has managing offices in Dallas.

Baxter is a member of the board of directors, Arkansas Economic Council, Arkansas Industrial Association, American Gas Association, and a member of the board of trustees, Southwest Research Institute.

C. J. Mowery has been named process superintendent for Carter Oil Co.'s new Billings, Mont., refinery, now nearing completion. Other personnel named at the plant include: **Robert E. Boydston,** chief engineer; **James W. Bateman,** technical department head; **W. G. Hockbarger,** chief chemist; **A. L. Robinson,** personnel manager; **George D. Spooner,** general mechanical foreman; **R. W. Burns,** catalytic unit foreman; **Charles F. Moberly,** crude-oil fractionating unit foreman; **M. A. Price,** foreman of treating; and **J. S. Bernier,** planning engineer. The company previously announced appointment of **Herman G. Gunter** as general superintendent of the new plant.

J. L. Jones, assistant district manager for United Gas Co. at Shreveport, has been named acting district manager succeeding **F. E. Lacaze,** retired. Jones started with United in 1929 as a clerk in the Shreveport district. In 1933 he was promoted to office supervisor, and to assistant district manager in 1935. He was made district pipe line superintendent in 1940, which he held until his appointment as assistant district manager last year. Lacaze stepped down from active service after more than 37 years with United companies. He has been Shreveport district manager for the past 15 years.

Waldemir Ziloff, French Petroleum Institute, has arrived in Los Angeles, where he will study petroleum techniques for the next 2 years.

James MacPherson, vice president and resident manager in Saudi Arabia for Arabian American Oil Co., will resign August 1 to become vice president and general manager in charge of operations for American Independent Oil Co., in the Kuwait-Saudi Arabian Neutral Zone.

Dr. Paul T. Walton has become a partner of the newly organized firm of Morgan & Walton Oils, which is headquartered in Salt Lake City. Walton was formerly chief geologist for Rocky Mountain Division, Pacific Western Oil Corp.

Geoffrey S. Hill, superintending engineer (prospecting fields) for India and Pakistan, Burmah Oil Co., Ltd., has left for the United Kingdom on retirement after 25 years service in the East. For the past 2½ years he has been responsible for the survey, planning, layout, and construction of all B.O.C. fields prospecting in India and Pakistan. He joined B.O.C. in Lower Assam, India, in 1924 and during the war was engaged in engineering projects for the Government of India. A specialist in the planning of new engineering projects, Hill is expected to continue this work in an advisory capacity.

William D. Harbert, formerly process engineer with Lion Oil Co., El Dorado, Ark., has resigned to join the research department of Pittsburgh Consolidation Coal Co.

H. L. Rase, Jr., seismic party chief for Gulf Research & Development Co., Shawnee, Okla., has been transferred to Sayre, in western Oklahoma, in the same capacity.

Paul C. Evans, Gulf Oil Corp., Hobbs, N. M., has been elected chairman of the newly constituted Southeastern New Mexico chapter, American Petroleum Institute, division of production. Other officers include: **Charles D. Sands,** Ohio Oil Co., Hobbs; **Ralph L. Gray,** Buffalo Oil Co., Artesia; and **W. M. Halloway,** National Supply Co., Hobbs, vice chairmen; and **M. B. Moseley,** Gulf Oil Corp., Hobbs, secretary-treasurer.

Roy J. Diwoky, assistant general superintendent, Whiting refinery, Standard Oil Co. (Ind.), has been named executive assistant to the president of Pan American Petroleum Corp., Standard subsidiary, and will be located at the New Orleans headquarters where he will also serve as a director of Pan American. He became associated with Indiana Standard in 1935, and after 5 years' service in the research department, he was transferred to the manufacturing department where he rose to the position of assistant general superintendent of the Whiting refinery. **C. F. Smith,** superintendent of the light-oils division at Whiting, has been promoted to assistant general superintendent, replacing Diwoky. He joined the company in 1928 in the engineering department at Whiting, and served at the Casper, Wyo., refinery. **Dr. Ford H. Blunck,** general foreman of the pressure stills department in the light-oils division at Whiting, will succeed Evans. Blunck joined Indiana Standard in 1936 as a chemist in the research department at Whiting.

R. J. DIWOKY

Florent H. Bailly has been elected president of Pantepec Oil Co., C.A., and Pancoastal Oil Co., C.A., succeeding **C. U. Daniels.** Bailly, whose headquarters are in Caracas, is a geologist and petroleum engineer who has been associated with Pantepec and its predecessor companies for the last 25

PERSONALS

Guy A. Tompson, Bethlehem Supply Co., newly elected president of Petroleum Equipment Suppliers Association, is shown with A. W. McKinney, National Supply Co., retiring president (center), and Ted Sutter, Baker Oil Tool Co., new vice president of the association. The group held its fourteenth annual meeting in Colorado Springs June 5-7

years. His home is originally Pasadena, Calif. Daniels, vice president of Oklahoma Natural Gas Co. before joining Pantepec about 2 years ago, was made chairman of the stockholders committee of Pantepec and will devote his attention to the interests of the company outside Venezuela in Texas, Florida, and Canada.

W. D. C. Mackenzie has been transferred to Calgary, Alta., Canada, as assistant manager of the western division, producing department, Imperial Oil, Ltd. He formerly was chief engineer in Toronto. He joined Imperial at Calgary in 1936, and a year later took charge of subsurface geological work in Turner Valley field.

Brandon Grove, an official in the administrative section of the producing department, Socony-Vacuum Oil Co., Inc., in New York, left the United States recently on a business trip to Egypt.

Andrew K. McGill, geologist, Socony-Vacuum Oil Co., Inc., in Colombia and Peru who joined the Socony-Vacuum organization in 1934 in Colombia, went on retired status early in June. His home is in Tharandala, Ont.

Harold D. Jenkins, chief geologist, Kerr-McGee Oil Industries, Inc., has resigned to become vice president and general manager of Decem Drilling & Production Co., Oklahoma City.

Edward M. Mutz, who joined the Sinclair organization in 1920 at Philadelphia, has been elected vice president of Sinclair Oil Corp. Mutz was transferred to the New York office in 1923 and held various positions in the treasury department. In 1943, he was elected assistant treasurer, Sinclair Oil Corp., a position he continues to hold in addition to the office of vice president.

W. E. McCommons, formerly an engineer with Halliburton Oil Well Cementing Co., Evansville, Ind., has joined the staff of Coy Oil Co., Evansville, as geologist-engineer.

Thomas W. James, chief operator, process department, Baltimore refinery, Esso Standard Oil Co., has received a $200 cash award for his operating suggestions in the company's "Coin Your Ideas" plan. Others to receive awards recently include: **John Balog,** sweaterman, paraffin department, Bayonne, N. J., refinery, $100; **J. C. Beckwith,** assistant operator and compressorman, Baton Rouge, La., refinery, $500; and **J. C. Ellis,** operator, Baton Rouge refinery, $300.

Ed Borrego, manager of the exploration operations in the Po Valley of Italy for the Standard Oil Co. (N.J.) organization, has arrived in the United States for company conferences.

L. R. Owen, member of the foreign-trade committee of Socony-Vacuum Oil Co., Inc., has been elected treasurer of the new American-Turkish Association which has been organized in New York.

Maurice L. Brown, assistant manager, Shallow Water Refining Co., Garden City, Kans., has been appointed general manager of the company.

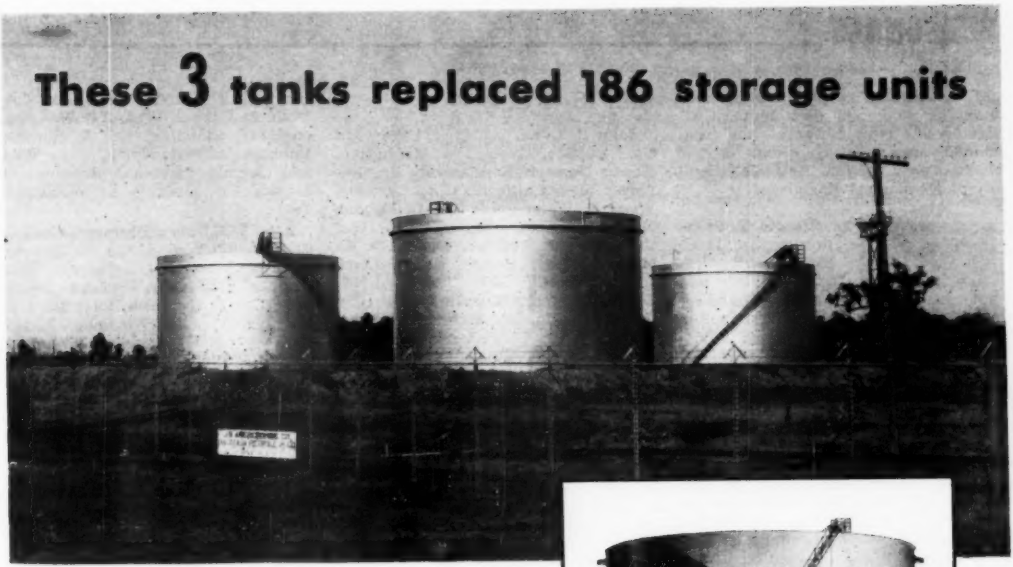
I. T. Watson, Jr., Mt. Carmel, Ill., has joined Illinois Mid-Continent Co. as petroleum engineer at Mt. Carmel.

Richard K. Wildermuth, engineering department, Socony-Vacuum Oil Co., Inc., New York, has been transferred to the technical department at the company's East St. Louis, Ill., refinery. **Judson B. Parker,** pipe-department foreman at East St. Louis refinery, has been named technical assistant to the maintenance superintendent for Raffineria de Napoli, S. P. A., in Naples, Italy.

Glenn S. Shreeve, production foreman, Shell Oil Co., Inc., Archer City, Tex., was recently awarded a certificate of honor from U. S. Bureau of Mines, for saving a life by artificial respiration at a ranch home near Scotland, Tex.

Two employes of Tide Water Associated Oil Co.'s Avon, Calif., refinery recently received substantial cash awards for suggestions submitted during 1948 under the company's suggestion plan. L. F. Bayer, vice president and chairman of the operating committee, left, is shown awarding Louis S. Radeke, center, $1,600, and Paul S. Hawthorne, right, $1,050 for their winning suggestions at a luncheon held in San Francisco. Bayer revealed that J. L. Cartisser, employe of the company's manufacturing department, eastern division, had won top company honors during 1948, receiving awards totaling $2,100. Awards are made by the company during each year for best suggestions to improve operations

These 3 tanks replaced 186 storage units



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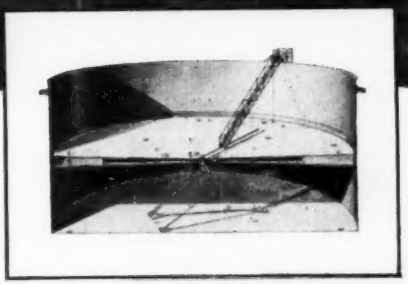
of HORTON

Double-Deck Floating Roofs



Cutaway view showing construction details of a Horton Double-Deck Floating Roof installed in welded tank.

To materially reduce evaporation losses of petroleum products, the three 20,000-bbl. Horton Floating Roof Tanks shown above were installed at a Sweeny, Texas, gas separation station operated by the J. S. Abercrombie Co. Formerly, 186 storage units were used to do the same job—but these three tanks, together with other features of Abercrombie's recent modernization program, will save 195,000 bbls. of liquid hydrocarbons formerly lost to the atmosphere annually.

The use of Horton Double-Deck Floating Roofs results in savings like these because they completely eliminate evaporation losses due to filling and greatly reduce those caused by breathing and boiling. Since these roofs float directly on the liquid being stored, there is no vapor space such as found in a tank with a fixed roof. This means that breathing of tank vapors is kept to a minimum and filling losses do not occur for the reason that there are no vapors to be displaced by the incoming liquid. The air space between the top and bottom roof decks serves as an insulating medium to prevent the boiling of all but the more volatile products.

You can cut your evaporation losses by using the Horton Double-Deck Floating Roof on welded or riveted tanks that are filled and emptied frequently and tanks used in blending service. Horton Floating Roofs can also be used advantageously on tanks storing corrosive hydrocarbons as they reduce corrosive action by preventing air from coming into contact with the underside of roof plates.

Send for a copy of Bulletin B, which contains complete information about Horton Floating Roofs.

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Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 14.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3...1615—1700 Walnut Street Bldg.
Salt Lake City, 1..1525 First Security Bank Bldg.
San Francisco, 11..1254—22 Battery Street Bldg.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.

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Horton Steel Works, Limited, Fort Erie, Ontario, Canada
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Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Compagnia Tecnia Industrie Petroli, Via Sapri 7, Rome, Italy
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland

PERSONALS

R. L. Nichols, instrument shop foreman at Magnolia Petroleum Co.'s Beaumont, Tex., refinery, has been named area vice chairman of the South Texas section, American Society of Mechanical Engineers.

J. A. CLARK

Harold C. Price, president of H. C. Price Co., Bartlesville, Okla., and **James Ashley Clark,** production operations adviser, Standard Oil Co. (N.J.), New York City, were among a group of alumni of School of Mines, Golden, Colo., who were awarded the distinguished achievement medal of the school recently. The medals were awarded for outstanding accomplishment in the fields of mineral engineering.

Madison Taylor, district petroleum engineer, Gulf Oil Corp., has been named second vice president of the Petroleum Engineers Club, Fort Worth, succeeding **Jack Sales,** who resigned.

V. L. Red, superintendent of the West Texas district, Midland, for Magnolia Pipe Line Co., will be transferred to Olden, Tex., as district superintendent, effective July 1. Other changes to be made on that date include: **C. C. Coffindaffer,** Olden district superintendent, transferred to Healdton, Okla., as superintendent of the Healdton district; and **H. M. Van Buskirk,** district superintendent at Healdton, transferred to Midland as superintendent of the West Texas district, with headquarters in Midland.

C. L. WILSON

Charles L. Wilson, Stanolind Pipe Line Co. district foreman in the Topeka, Kans., area, has been transferred to Kearny, Neb., where he will be in charge of the company's newly established district office.

Don Polk, formerly in charge of the crude-oil purchasing department of Esso Standard Oil Co. in Baton Rouge, has been transferred to the headquarters office at Shreveport.

John V. Persons, formerly professor of petroleum engineering at Texas A. & M. College, has been named oil-loan engineer for the National Bank of Commerce in Houston.

SHIFTS—

John R. Lynn, geologist, Carter Oil Co., Buffalo, Wyo., to Manhattan, Kans.; **Norman E. Maxwell, Jr.,** engineer, The California Co., Laramie, Wyo., to Waterproof, La.; **C. Eugene Naugle,** engineer, Mayes-Bevan Co., Cherokee to Medford, Okla.; **D. D. Moore,** foreman, Seismic Explorations, Inc., Cordell to Sayre, Okla.; **J. W. Evertz,** foreman, Stanolind Pipe Line Co., Ada to Hominy, Okla.; **H. L. Rase, Jr.,** geologist, Gulf Research & Development Co., Shawnee to Sayre, Okla.; **Alan Britton,** engineer, Shell Co. of Venezuela, Ltd., Las Piedras Falcon, Vz. S.A., to London.

Henry Dale Loeb, engineer, Shell Oil Co., Inc., New York to Scarsdale, N. Y.; **Joseph Thomasson,** foreman, Stanolind Pipe Line Co., Craig, Colo., to Hays, Kans.; **Frederick F. Dueser,** engineer, Republic Natural Gas Co., Golden, Colo., to Ellinwood, Kans.; **Frank A. Morgan,** geologist, Stanolind Oil & Gas Co., Salt Lake City, Utah, to Casper, Wyo.; **M. W. Legge,** engineer, Stanolind Oil & Gas Co., Lubbock to Fort Worth, Tex.; **Rousseau Arnold,** foreman, Stanolind Oil & Gas Co., Refugio to Woodsboro, Tex.

King W. Massey, engineer, Shell Oil Co., Inc., Maplewood, La., to Houston, Tex.; **A. J. Maier, Jr.,** engineer, Stanolind Oil & Gas Co., Vivian to Bossier City, La.; **E. E. Smith,** foreman, Continental Oil Co., Westlake, La., to Billings, Mont.; **Robert A. Wiegand,** engineer, Sinclair Refining Co., Olympia Fields to Homewood, Ill.; **R. C. Heil,** engineer, The Texas Co., Salem, Ill., to Marlow, Okla.; **Bert Aiguier,** superintendent, Danciger Oil & Refining Co., Brookhaven, to Meadville, Miss.; **Warren O. Johnson,** engineer, Republic Natural Gas Co., Golden, Colo., to Pauls Valley, Okla.; **H. F. Thompson,** foreman, The Atlantic Refining Co., Lyons, Kans., to Sweetwater, Tex.

DEATHS

Lew Wentz, pioneer Oklahoma oil man and philanthropist, died June 9 in Ponca City, Okla. He was active in development of several oil fields in Oklahoma, including the Blackwell field, and formerly was head of Wentz Oil Corp. He closed the firm several years ago to operate as an independent. A national political figure, Wentz served as Republican national committeeman for Oklahoma.

Edward Bierschwale, 64, deputy supervisor of the oil and gas division, Texas Railroad Commission, died in San Angelo, Tex., June 9.

Jay W. Turner, 40, credit manager for Republic Supply Co., Houston, was killed in an automobile accident near Seguin, Tex., June 8.

Fred S. Durham, Sr., president of Bonney Forge & Tool Works, Allentown, Pa., died May 28.

Robert Van Vleck Anderson, 65, geologist who from 1933 to 1944 was associated with Socony-Vacuum Oil Co., Inc., died June 6 in Palo Alto, Calif. He had served on the Oil Land Classification Board in California.

Julian Erasmus Hoffman, 48, an employe of the Humble Pipe Line Co. for 18 years, died June 9 in Houston.

Ernest Tallie Maule, 69, employe of Sinclair Prairie Oil Co. refinery at Sand Springs, Okla., for 35 years, died June 8.

Lionel M. Jagou, 53, superintendent of the Drumright, Okla., refinery of Tide Water Associated Oil Co., died June 11 in Drumright. He had been associated with Tide Water since 1930 and had been superintendent at Drumright since 1936.

R. O. Langworthy, 51, assistant office manager for Stanolind Oil & Gas Co., Midwest, Wyo., died June 7.

W. B. Flynn, 68, Port Arthur, Tex., independent oil operator for 47 years, died June 11. He served for several years as vice president of Paraffine Oil Co.

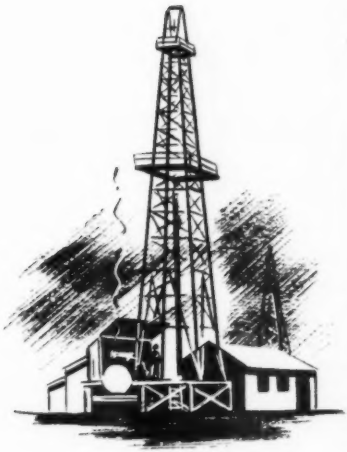
Gerald C. Connolly, 57, technologist with Esso Laboratories' chemical division, Standard Oil Development Co., Linden, N. J., died June 5 in Elizabeth, N. J.

William Van Holst Pellekaan, Beverly Hills, Calif., veteran geologist and formerly vice president in charge of exploration for Shell Oil Co., Inc., died June 7.

David H. Whitehill, Wichita Falls, Tex., independent oil man, died June 2.

George Albert Ray, Sr., 91, pioneer Texas oilman, died June 9 at his ranch near Pettus.

Dr. Walter Miller, 68, retired vice president, Continental Oil Co., died June 8 in Ponca City, Okla.



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You always save time with ARMCO Casing because the slip-joint collars and accurately machined pipe ends assure fast line-ups without clamps. Slips and elevators fit the pipe. No special equipment is needed. A few minutes and you have a first-class joint. Field welders say they like to work with ARMCO Casing.

Other advantages include long 40-foot lengths that expedite hauling and handling. This also means fewer joints and less assembly. The collars have uniform wall thickness and there are no costly threaded joints to make up.

Keep in mind that ARMCO Casing is strong yet light in weight—that you can specify the exact size and weight of pipe needed for the job. Diameters range from 8 to 24 inches; wall thicknesses from 3/16- to 1/2-inch. Write for complete information. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 1175 Curtis Street, Middletown, Ohio; 501 Mayo Building, Tulsa, Oklahoma.

Export: The Armco International Corporation

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Trend Toward Larger Lube-Oil Plants Revealed in Recent N.P.A. Survey

by George Weber

The National Petroleum Association, an organization of petroleum refining companies, with headquarters in Washington, D. C., recently completed a survey of domestic facilities for manufacture of lubricating oils. The resulting data, representing the most complete and detailed compilation of its kind currently available, is here published exclusively by permission of N.P.A., after dissemination to association membership.

A MEASURE of the current facilities for production of domestic lubricating oil and an index to trends in the industry are revealed in a recent survey of that branch of petroleum refining, conducted by the National Petroleum Association. Data were supplied directly by companies concerned, through questionnaires circulated in February and March 1949.

The survey shows a total maximum capacity for the daily production of 176,747 bbl. of finished lubricating oil. This total includes several projects now under construction, most of which will be in operation before the end of 1949. Also included in total figures are estimates of capacity for the few cases where such data were not reported.

Examination of these new facilities gives an insight into a marked trend in lubricant manufacture—the growing concentration of activity in larger plants. This trend is the logical result of modern technology, under which new methods of vacuum distillation, solvent refining, dewaxing, and deasphalting prove readily adaptable to large-scale operations.

The average capacity per plant nationally is about 2,500 bbl. daily. As shown in Table 1, compiled from the survey, a total of 16 plants representing less than 25 per cent of the total produce more than 2,500 bbl. per day each. Their total daily productive capacity is estimated at nearly 120,000 bbl., or 67.5 per cent of national capacity. Further, it is noted that most projects in the current construction program are located in this size class of refinery.

Geographically, lubricating-oil manufacture conforms to general refining distribution with the exception of the Pennsylvania area, where lubricants dominate the products picture. As shown in Table 2, Gulf Coast and East Coast refineries account for well over half the nation's productive capacity for lubes as well as other refined products.

Solvent Refining

The impact of solvent technique on modern lube manufacture is clearly shown in the N.P.A. survey. A relatively recent development, solvent extraction, dewaxing, and deasphalting now dominate the industry. The survey shows a total of 36 refineries employing solvent extraction units with daily charge capacity for over 181,000 bbl. Solvent dewaxing facilities can process nearly 120,000 bbl. daily, and propane deasphalting has grown to a daily capacity for 60,000 bbl. of charge stock.

The character of new refining facilities, recently completed and due for initial operation this year, further reveals the growth of solvent refining. Of the total capacities given above, this current expansion program accounts for 33 per cent of solvent extraction, 25 per cent of solvent dewaxing, and 17 per cent of propane deasphalting. These new facilities are being installed in every refining section of the nation.

The wide variety of processes and methods for finishing lubricating oils is illustrated by the types of plants listed. Altogether, 17 different processes are reported in use, most of them being developments of the past 15 years. But the most important result of the new technology and its translation into commercial plants does not appear in statistical surveys. That result is the greatly enhanced quality of lubricants of all types, made possible by better separation of petroleum lube fractions and their further improvement by chemical additives.

TABLE 1—CLASSIFICATION OF LUBRICATING-OIL PLANTS BY PRODUCTIVE CAPACITY

Capacity (bbl. per day)—	No. plants	Per cent total	Capacity	Per cent total
1,000 and less	31	44.3	18,709	10.5
1,000-2,500	23	32.9	38,305	22.0
2,500 and greater	16	22.8	119,733	67.5
Total	70	100.0	176,747	100.0

TABLE 2—GEOGRAPHICAL CLASSIFICATION OF LUBRICATING OIL PLANTS

Area—	No. plants	Capacity, bbl. per day— Total	Average	Per cent total
East Coast	7	36,900	4,600	21.0
Pennsylvania	18	18,385	1,000	10.0
Midwest	9	13,100	1,450	7.5
Southwest	18	21,339	1,250	12.0
Gulf Coast	10	69,683	7,200	39.5
Pacific and Mountain	8	17,340	2,150	10.0
Total	70	176,747	*2,525	100.0

*National average

TABLE 3—UNITED STATES REFINERIES PRODUCING LUBRICATING OILS—SURVEY BY NATIONAL PETROLEUM ASSOCIATION

Refinery and location—	Crude capacity (bbl. per day)	Solvent extraction	Solvent dewaxing	Propane deasphalting	Finished lube capacity	Lube processes
Atlantic Refining Co., Philadelphia, Pa.	117,000	5,600	3,500	3,500	5,000	Nitrobenzene, phenol, MEK-benzol, propane, acid and clay
Bayou State Oil Corp., Hosston, La.	800				400	Acid and clay
Berry Asphalt Co., Waterloo, Ark.	1,200				350	Conventional
Calumet Refining Co., Burnham, Ill.	1,200				750	High-vacuum distillation
Calumet Refining Co., Princeton, La.	700				425	Crude distillation, acid and clay

Refinery and location—	Crude capacity (bbl. per day)	Solvent extraction	Solvent dewaxing	Propane deasphalting	Finished lube capacity	Lube processes
Champlin Refining Co., Enid, Okla.	18,000	2,850			1,800	Duo-Sol, phenol
Citcon Corp., Lake Charles, La.		*15,200	*7,500		*6,000	Duo-Sol, Furfural, MEK-benzol
Cities Service, Ponca City, Okla.	15,000				1,050	Acid and clay
Cities Service, Titusville, Pa.	3,000				750	Conventional
Continental Oil Co., Ponca City, Okla.	33,000	3,850	1,850		1,800	Duo-Sol, Furfural, MEK-benzol, Barisol
Cooperative Refining Assoc., Coffeyville, Kans.	13,500	1,800	*1,500		1,500	Furfural, MEK-benzol
Henry H. Cross Co., Smackover, Ark.	6,000				1,000	Vacuum distillation, acid and clay
Crown Central Petroleum Corp., Houston, Tex.	18,000				1,300	Conventional
Deep Rock Oil Corp., Cushing, Okla.	12,500				864	Conventional
Elk Refining Co., Falling Rock, W. Va.	4,000				1,000	Conventional
Esso Standard Oil Co., Baltimore, Md.	60,000				100	
Esso Standard Oil Co., Bayonne, N. J.	30,000	2,000	*6,000		6,500	Phenol, MEK-benzol, acid and clay
Esso Standard Oil Co., Baton Rouge, La.	235,000	10,500	7,500	3,500	7,000	Phenol, MEK-benzol, propane dewaxing and deasphalting, acid and clay
Freedom-Valvoline Oil Co., Freedom, Pa.	4,000				800	Conventional
Golden Bear Oil Co., Bakersfield, Calif.	2,500	500			1,100	Furfural
Gulf Oil Corp., Philadelphia, Pa.	76,700	3,000	†1,200		1,100	Duo-Sol
Gulf Oil Corp., Port Arthur, Tex.	230,000	11,000	3,400 ‡2,700	4,000 12,600	12,000	Furfural, phenal, MEK-benzol, propane, Alchlor, Sharples dewax
Humble Oil & Refining Co., Baytown, Tex.	237,000	8,500	10,000	7,800	12,200	Propane, phenol, MEK-benzol, acid and clay, treating
Kendall Refining Co., Bradford, Pa.	4,800	900	1,200	1,200	1,200	Phenol, propane, pressing
Lion Oil Co., El Dorado, Ark.	22,000				1,000	Vacuum distillation (spec.)
McBride Refining Co., La Blanca, Tex.	2,500				100	Conventional
MacMillian Petroleum Corp., Norphlet, Ark.	4,000				1,700	Vacuum distillation (spec.)
Magnolia Petroleum Co., Beaumont, Tex.	150,000	*9,300	*8,500			MEK-benzol, Duo-Sol, Furfural
Mid-Continent Petroleum Corp., Tulsa, Okla.	46,000	5,000	2,500	2,000	4,000 to 5,000	Chlorex propane
National Refining Co., Findlay, Ohio	9,500				600	Acid and clay, treatment
Palomar Refining Co., Bakersfield, Calif.	1,300					Vacuum distillation
Penna. Refining Co., Karns City, Pa.	1,500				300	Conventional
Pennzoil Co., Oil City, Pa.	8,500	1,000	2,250		2,250	Chlorex, MEK-benzol
Petrolite (Amer. Wax Co.), Kilgore, Tex.			88			MEK-benzol
Phillips Petroleum Co., Okmulgee, Okla.	11,000				1,000	Acid and clay
Phillips Petroleum Co., Kansas City, Kans.		*3,000	*2,000	*2,000	*1,500	Phenol, propane
Pioneer Oil & Refining Co., Somerset, Tex.	400				400	Contact filtration
Premier Oil Refining Co., Fort Worth, Tex.	8,000				700	Conventional
Pure Oil Co., Cabin Creek, W. Va.	5,500				515	Conventional
Pure Oil Co., Nederland, Tex.	58,200				*2,150	Phenol, MEK, propane
Quaker State Oil Refining, Emlenton, Pa.	2,000	1,680	2,000		1,700	Furfural, MEK-benzol
Quaker State Oil Refining, Farmers Valley, Pa.	4,000	1,680	2,700		2,295	Furfural, MEK-benzol
Quaker State Oil Refining, Oil City, Pa.	2,800				600	Conventional
Quaker State Oil Refining, St. Marys, W. Va.	2,500	680			600	Furfural
Richfield Oil Corp., Watson, Calif.	85,000				275	Vacuum distillation, conventional
Shell Oil Co., Inc., Houston, Tex.	110,000	5,400	3,700	3,800	2,800	Phenol, propane, MEK-benzol, clay and acid
Shell Oil Co., Inc., Martinez, Calif.	45,000	4,880			3,100	Sulfur dioxide, Furfural
Shell Oil Co., Inc., Wood River, Ill.	115,000	3,000	3,600	3,300	3,100	Duo-Sol, propane, acid and clay
Sinclair Refining Co., East Chicago, Ind.	85,000	5,100	4,750	4,250	2,300	Propane, phenol, MEK-benzol
Sinclair Refining Co., Houston, Tex.	85,000	3,500	4,000	4,000	3,233	Propane, phenol, MEK-benzol, acid
Sinclair Refining Co., Wellsville, N. Y.	9,000		1,500	3,500	2,250	Nitrobenzene, MEK-benzol, contact treating
L. Sonneborn Sons, Inc., Franklin, Pa.	2,000				900	Conventional
L. Sonneborn Sons, Inc., Petrolia, Pa.	4,000				1,000	Conventional
Socony-Vacuum Oil Co., Olean, N. Y.	7,000	1,300	1,200			Chlorex, MEK-benzol
Socony-Vacuum Oil Co., Paulsboro, N. J.	*64,000	*7,580	*4,920	*5,950		MEK-benzol, Duo-Sol, Furfural
Standard Oil Co. of Calif., Richmond, Calif.	138,000	16,500	5,800		9,000	MEK-benzol, R.P.M., Solvent, phenol
Standard Oil Co. (Ind.), Casper, Wyo.	14,000	460			320	Chlorex
Standard Oil Co. (Ind.), Whiting, Ind.	175,800	3,100	2,200	1,200	1,750	Phenol, propane
Standard Oil Co. (Ind.), Wood River, Ill.	42,600	1,800	2,350		1,050	Chlorex, propane
Standard Oil Co. (Ohio), Cleveland, Ohio	42,500				1,500	Conventional
Standard Oil Co. (Ohio), Toledo, Ohio	21,000				900	Conventional
Sun Oil Co., Marcus Hook, Pa.	140,000	8,000	4,500		11,800	Duo-Sol, Furfural, MEK-benzol, vacuum distillation (spec.), propane
Texas Co., Lawrenceville, Ill.	27,000	2,000	1,400		1,150	Furfural, acetone-benzol
Texas Co., Port Arthur, Tex.	190,000	14,500	8,000	4,000	18,000	Furfural, sulfur dioxide, MEK-benzol, propane
Three Rivers Refinery, Three Rivers, Tex.	1,500				750	Vacuum distillation, acid and clay
Tide Water Assoc. Oil Co., Avon, Calif.	85,000	1,660			1,660	Sulfur dioxide
Tide Water Assoc. Oil Co., Bayonne, N. J.	70,000	7,000	3,500	3,400	2,400	Sulfur dioxide, Furfural, MEK-benzol, propane
Union Oil Co. of Calif., Oleum, Calif.	*67,000	*7,200	*1,900		*1,800	Duo-Sol, phenol, propane, acid and clay
United Refining Co., Warren, Pa.	5,500					Conventional
Utah Oil Refining Co., Salt Lake City	23,500				85	Conventional
Warwick Wax Refining Co., Chanute, Kans.			100			
Waverly Oil Works Co., Pittsburgh, Pa.	2,500				275	Conventional
Wolf's Head Oil Refining Co., Reno, Pa.	2,500				650	Conventional

*Partly or entirely under construction. †Sharples dewaxing. ‡Alchlor refining.

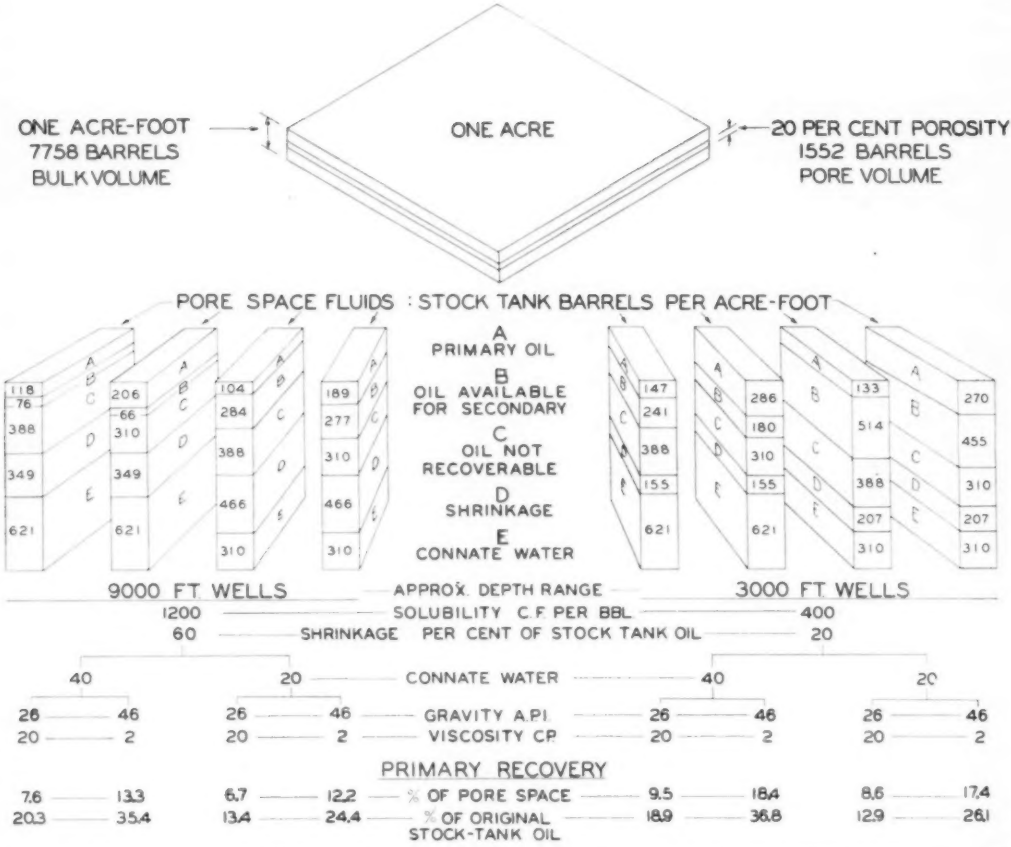


Fig. 1—Breakdown of pore-space fluids contained in an acre-foot of productive formation, and showing reservoir factors controlling the ultimate recovery of oil

Oil Recovery Prediction

by George R. Elliott and William L. Morris

INTRODUCTION

THE nature of the petroleum industry requires that investments be based on preliminary predictions of oil recovery. These predictions must be made soon after discovery of a new field, and cannot wait for the production history necessary for more accurate methods of calculation. When adequate histories and reservoir data become available, future performance curves for gas-drive reservoirs can be drawn, based on relative permeabilities to oil and gas, in the manner of Babson,[1] Tarner,[2] and Muskat.[3] Along with these mathematical solutions there is need for a convenient preliminary method having a scientific basis.

This paper presents graphs for the prediction of oil recoveries from solution-gas reservoirs with fully saturated crude. The graph is based primarily on the controls of oil viscosity, oil shrinkage, and connate-water saturation as studied by Muskat and Taylor.[4] Comparison has been made with calculations for actual reservoirs and with recoveries from statistical data and published reports. Some adjustments have been made in the graphs, especially in the extreme positions, to fit the actual reservoir data more closely.

It is quite usual for recovery predictions to be required when the only available reservoir data are depth of the producing formation, gravity of the oil, a productivity indication of high or low permeability, porosity of the formation as inferred from other pools. To enable predictions to be based on these data only, the nomograph includes average correlations between gravity and vis-

cosity, and between depth and shrinkage.

The authors would like to have this effort regarded as an initial approach. It is the beginning of a method which needs further support, both theoretical and statistical, to establish its full usefulness.

Pore Space Fluids

A diagram (Fig. 1) has been drawn to illustrate the geometry of the acre-foot unit. The upper part of the diagram represents an area of 1 acre, 1 ft. thick (not to scale). The acre-foot thus illustrated is the one constant reservoir quantity; it represents 7,758 bbl. of bulk volume. Porosity of oil reservoirs range in general from 10 to 30 per cent; a middle figure of 20 per cent being selected, the pore space is 1,552 bbl. and is represented in the diagram by a layer one-fifth of the formation thickness. This pore space contains connate (interstitial) water and oil; the oil being fully saturated with gas in solution.

The eight blocks in the diagram represent eight combinations of the five fluids occupying the pore space. These five fluids are:

A: Space occupied by stock-tank oil recoverable by primary means;

B: Space occupied by stock-tank oil recoverable by secondary means;

C: Space occupied by stock-tank oil not recoverable by any primary or secondary processes;

D: Space occupied by the gas in solution in the original oil in the reservoir, and represented by the shrinkage of all the oil in the reservoir from original reservoir conditions to stock-tank conditions;

E: Space occupied by connate (interstitial) water.

Subtraction of connate-water saturation leaves the space occupied by reservoir oil. Two values for connate water have been selected: **40** and **20 per cent** of the pore volume.

To convert reservoir oil to stock-tank oil, the shrinkage is subtracted. Two values for shrinkage have been chosen: **60 per cent** and **20 per cent**, based on stock-tank oil; i.e., **1.60** and **1.20** reservoir volume factor.

Having subtracted the two fluids occupying the lower part of each **block in the diagram, D** and **E**, the three upper fluids, **A, B,** and **C**, constitute the original stock-tank oil. For **C**, oil not recoverable by any primary or secondary means, two values have been assumed, based on laboratory experiments and field experience: **20 per cent of the pore space for 2-cp. viscosity oil; 25 per cent of the pore space for 20-cp. viscosity oil.**

"A," primary oil, and **"B,"** oil available for secondary recovery, are the two quantities to be predicted.

Nomograph for Primary Recovery

Fig. 2 is a nomograph for the prediction of primary recovery from a solution-gas-drive reservoir. To illustrate the use of the nomograph, a reservoir is selected which produces crude having 3.1-cp. viscosity (stock-tank oil at 100° F.) and a shrinkage of 40 per cent (1.40 formation volume factor), the producing formation having 25 per cent average porosity. Draw a line through 3.1-cp. viscosity and 40 per cent shrinkage to the index axis; thence, through a middle value for connate water (25 per cent) to primary recovery 12.2 per cent of the pore space; thence, through 25 per cent porosity to primary recovery 235 bbl. per acre-foot.

Figs. 3, 4, and 5 illustrate the effect of the three factors: viscosity, shrinkage, connate water. In each graph, two of the three factors are fixed; the other is allowed to vary. Porosity is assumed 20 per cent throughout. Three recovery curves are shown in each graph: per cent of pore space, barrels per acre-foot, per cent of original stock-tank oil.

The following from Muskat and

Digest of Article

A graph is presented for use in preliminary prediction of oil recovery from solution-gas-drive reservoirs. It is based primarily on previously published theoretical studies, but recoveries indicated by the graph have been adjusted to conform more closely with actual recoveries from producing oil fields. The essential purpose is to provide a convenient and rapid method of determining a normal average or "talking" figure, to use until sufficient production history is available to permit a more accurate calculation.

The nomograph relates primary oil recovery to oil viscosity, oil shrinkage, connate-water saturation, and porosity, factors upon which oil recovery is directly dependent.

Additional scales are provided so that A.P.I. gravity may be used instead of viscosity, and solubility used instead of shrinkage. If not even an estimate of initial gas-oil ratio is available, use may be made of a formation depth scale. Another scale is added to allow predictions to be reduced for low permeability.

A second nomograph predicts the combined total of primary recovery and oil "available" for secondary recovery. This total corresponds to the oil recoverable by an effective natural water drive, where the reservoir pressure is maintained near the original pressure.

The primary prediction of the first nomograph may be subtracted from the total prediction of the second nomograph to obtain a figure for oil available for secondary recovery. This available oil represents the oil remaining in the reservoir after primary solution gas drive depletion, less the oil assumed as "not recoverable" by either primary or secondary means. To reduce "oil available for secondary" to the prediction of oil recoverable from a water-flooding project, some coefficient may be applied. This coefficient will involve the relative effectiveness of a water-flooding project after solution gas primary depletion, as compared to a natural water drive with original gas in solution.

This paper was presented at the latest joint meeting of the Texas sections of the A.I.M.E., Austin, Tex., and recently made available for exclusive publication in The Oil and Gas Journal.

The Authors

G. R. ELLIOTT

W. L. MORRIS

George R. Elliott is senior reservoir engineer for Phillips Petroleum Co., Bartlesville, Okla. Elliott is well known in the Mid-Continent for his work in making the term "reservoir engineer" a recognized addition to the oil industry. He received his B.A.Sc. degree from University of Toronto and did graduate work at Columbia University. He was associated with oil production in California and in Alberta, Canada, before joining the Phillips organization in 1936.

William L. Morris has been in charge of production physics in the research department of Phillips (at present is on loan for foreign work). Morris took his bachelor of science degree at Carnegie Institute of Technology, master's degree at University of Pittsburgh, and his doctor's degree in mathematics at Duke University in 1940. Before joining Phillips in 1941 he had been employed by Gulf Research & Development Co., and Kuwait Oil Co.

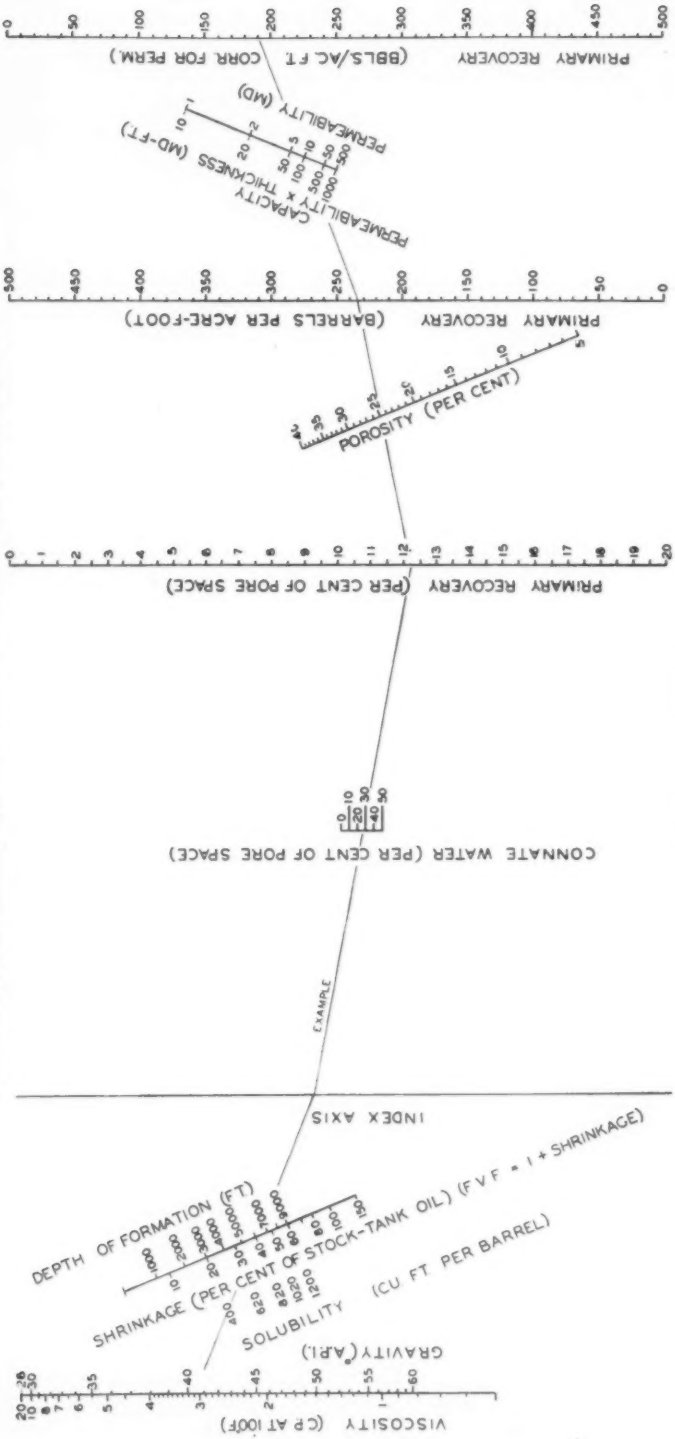

PRIMARY RECOVERY (BBLS./AC. FT. CORR. FOR PERM.)
PERMEABILITY (MD)
CAPACITY x THICKNESS (MD-FT)
PERMEABILITY
PRIMARY RECOVERY (BARRELS PER ACRE-FOOT)
POROSITY (PER CENT)
PRIMARY RECOVERY (PER CENT OF PORE SPACE)
CONNATE WATER (PER CENT OF PORE SPACE)
EXAMPLE
INDEX AXIS
DEPTH OF FORMATION (FT)
SHRINKAGE (PER CENT OF STOCK-TANK OIL) (F V F = 1 + SHRINKAGE)
SOLUBILITY (CU FT PER BARREL)
GRAVITY (°API.)
VISCOSITY (CP AT 100°F)

Fig. 2—Nomograph for preliminary prediction of primary recovery from solution gas drive reservoirs

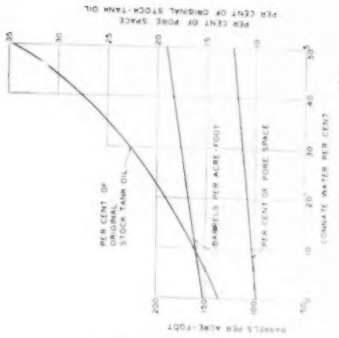

PER CENT OF ORIGINAL STOCK-TANK OIL
PER CENT OF PORE SPACE
PER CENT OF ORIGINAL STOCK-TANK OIL
BARRELS PER ACRE-FOOT
PER CENT OF ORIGINAL STOCK-TANK OIL
BARRELS PER ACRE-FOOT
PER CENT OF PORE SPACE
CONNATE WATER PER CENT

Fig. 5—(Right) Effect of connate water saturation on recovery (porosity 20 per cent, viscosity 4 centipoises, formation volume factor 1.40)

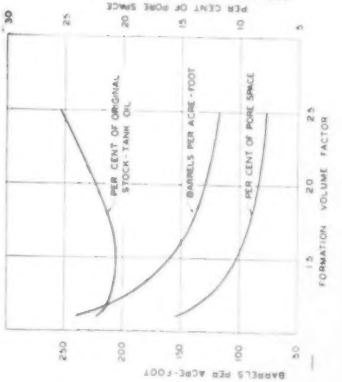
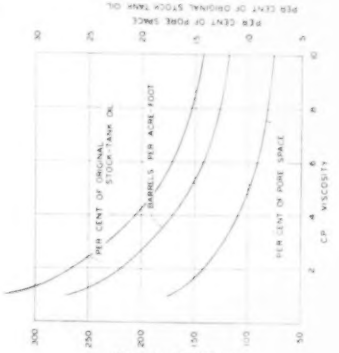

PER CENT OF PORE SPACE
PER CENT OF ORIGINAL STOCK-TANK OIL
PER CENT OF ORIGINAL STOCK-TANK OIL
BARRELS PER ACRE-FOOT
PER CENT OF ORIGINAL STOCK-TANK OIL
BARRELS PER ACRE-FOOT
PER CENT OF PORE SPACE
FORMATION VOLUME FACTOR

Fig. 3—(Left) Effect of oil viscosity on ultimate recovery (porosity 20 per cent, formation volume factor 1.40, connate water 25 per cent)

Fig. 4—(Right) Effect of oil shrinkage on recovery (porosity 20 per cent, viscosity 4 centipoises, connate water 25 per cent)


PER CENT OF ORIGINAL STOCK-TANK OIL
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BARRELS PER ACRE-FOOT
PER CENT OF ORIGINAL STOCK-TANK OIL
BARRELS PER ACRE-FOOT
PER CENT OF PORE SPACE
CP VISCOSITY

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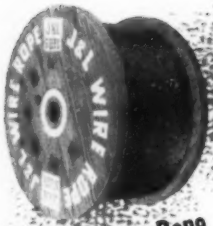
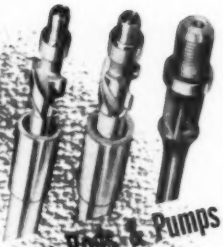


J & L Wire Rope

Cabot Pumping Units



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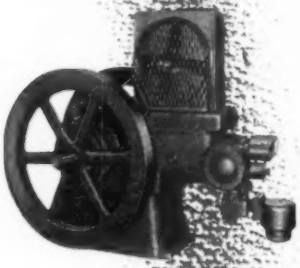
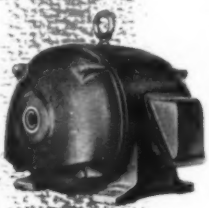
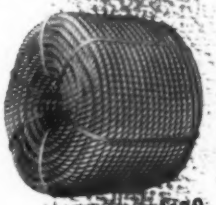


Fairbanks Morse Engines



Century Motors



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Taylor's table shows the oil recoveries corresponding to five viscosities, the other reservoir relationships being assumed to remain unchanged, (original pressure 2,500 psi.; connate water 30 per cent; 534 cu. ft. of gas per barrel in solution; shrinkage 44.5 per cent of the stock-tank oil):

Viscosity at atmospheric pressure, cp.	Stock-tank recovery, per cent of pore space
0.69	17.32
1.38	14.48
2.76	11.86
5.52	9.65
11.04	7.79

Fig. 3 illustrates the effect of viscosity, as taken directly from the primary nomograph (Fig. 2). The curves are drawn from the following table:

Porosity 20 per cent: F.V.F. 1.40: Connate water 25 per cent: Original stock-tank oil $= \frac{1,552 - 388}{1.40} = 831$

Visc.	Per cent pore space	Primary recovery, bbl. per acre-ft.	Per cent of original stock-tank oil
1	17.5	272	32.8
2	14.2	220	26.5
3	12.4	193	23.3
4	11.0	171	20.6
5	9.9	154	18.5
6	9.1	141	17.1
7	8.6	134	16.1
8	8.2	127	15.3
9	7.9	122	14.7
10	7.6	118	14.2

Increased recovery results from lower viscosity; recovery almost doubles in going from 10 to 2 cp. viscosity.

In Fig. 3, the recovery curve for per cent of original stock-tank oil parallels the other two. This is because both connate water and shrinkage remain constant, which is apparent by referring to Fig. 1.

Effect of Solubility-Shrinkage

The following from Muskat's and Taylor's Table 2 shows the effect of gas solubility and shrinkage: (In the last line, shrinkage is deliberately assumed to be 0 in order to emphasize the effect of shrinkage.)

Solubility at 2,500 psi. (cu. ft. per bbl.)	Atm. pressure viscosity (cp.)	Shrinkage* from 2,500 psi. (per cent)	Stock-tank recovery, per cent of pore space
267	1.38	15.4	17.33
534	1.38	30.8	14.48
1,068	1.38	61.6	10.44
1,068	2.76	61.6	8.41
1,068	1.38	30.8	17.16
534	1.38	0	26.85

*Based on reservoir oil.

Fig. 4 illustrates the effect of shrinkage, as taken directly from the primary nomograph (Fig. 2). The curves

(Continued on page 123)

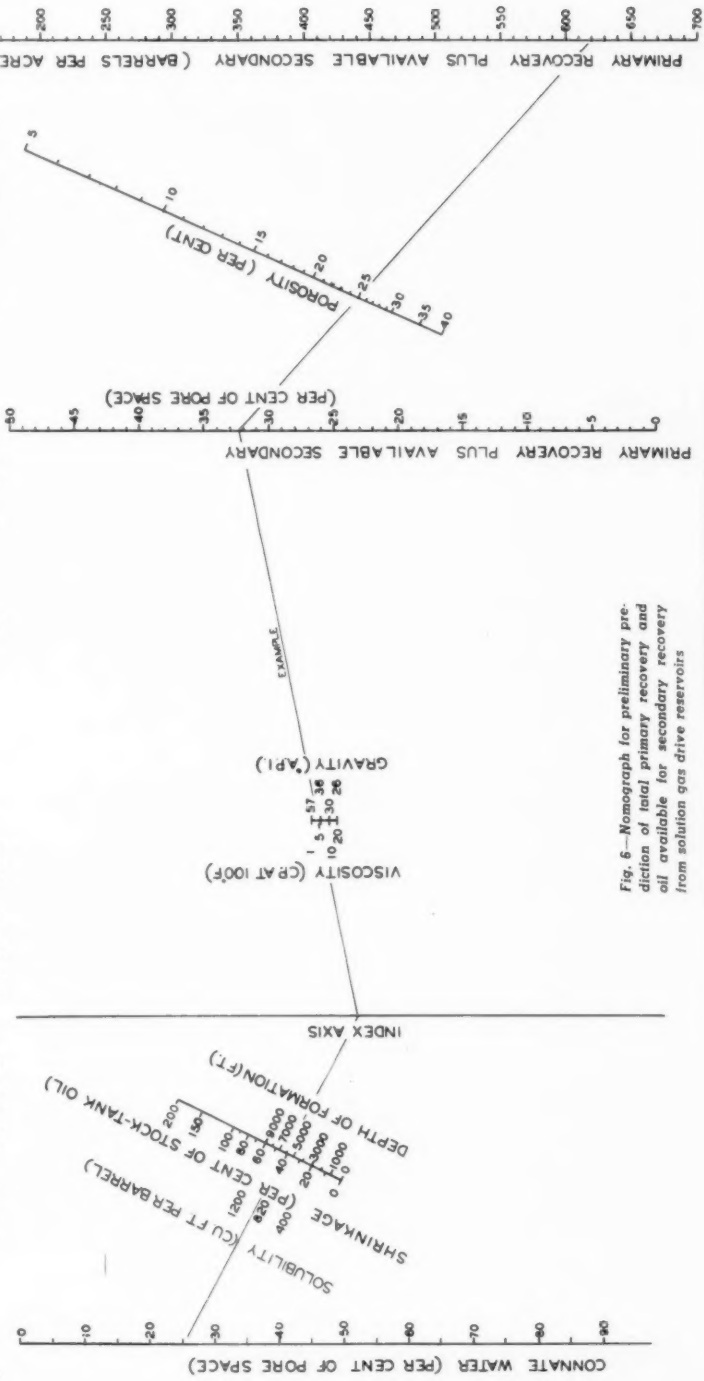

PRIMARY RECOVERY PLUS AVAILABLE SECONDARY (BARRELS PER ACRE-FOOT)
POROSITY (PER CENT)
PRIMARY RECOVERY PLUS AVAILABLE SECONDARY (PER CENT OF PORE SPACE)
EXAMPLE
GRAVITY (°API)
VISCOSITY (CP AT 100°F)
INDEX AXIS
DEPTH OF FORMATION (FT.)
SHRINKAGE (PER CENT OF STOCK-TANK OIL)
SOLUBILITY (CU FT PER BARREL)
CONNATE WATER (PER CENT OF PORE SPACE)

Fig. 6—Nomograph for preliminary prediction of total primary recovery and oil available for secondary recovery from solution gas drive reservoirs

Arguments on the Side of

Closer Well Spacing *and* In-Fill Drilling

by Dr. C. W. Tomlinson

CLOSE well spacing versus wide spacing?—In the June 9, 1949, issue of The Oil and Gas Journal (pages 68 et seq.) was a very interesting paper, "In-Fill Drilling" in the Pine Island-Caddo field of Northwest Louisiana, wherein Journal District Editor D. H. Stormont gave results for more than 1,000 new wells which recently have been drilled in amongst older, wider-spaced locations. The paper commencing on this page also is devoted to a discussion of closer well spacing—a moot subject among all oil operators and petroleum engineers.

C. W. TOMLINSON

The author at hand, C. W. Tomlinson, consulting petroleum geologist, independent oil operator of Ardmore, Okla., and 1949 president of the American Association of Petroleum Geologists, has long been an advocate on the "close spacing" side of the question. The material given here is part of his address given before the recent directors meeting of the Independent Petroleum Association of America held at New Orleans.

In opening his address, Dr. Tomlinson paid tribute to the members of I.P.A.A. and Vice President Harold Fell in their contributions in the recent building up of the crude-oil-supply potential, saying, ". . . many of the independent operators have been active in the valuable but less headline-making manner of finding commercial oil reserves that had been left behind in old fields . . . in the same old reservoirs where early wells had been drilled too far apart. For example, Harold Fell (Ardmore, Okla.) hasn't been water-flooding or repressuring. Some reservoirs are too lenticular for successful application of those methods. He has just been drilling in-fill wells among the old ones. It's a type of secondary recovery that is well adapted to some shallow fields, though out of harmony with some engineering theory. If it produces oil at a profit, however, that's the meat of the coconut.

"The fact that in-fill drilling does make money in some cases, where the wells are cheap, justifies restudy of the theory which held that the older wells were close enough together to recover all the oil that could be profitably extracted from the reservoir by primary methods. How large are these 'lost reserves' in the United States? Are we now creating more 'lost reserves' by drilling new fields with wells too far apart?"

ONE subject on the matter of oilfield development which has brought forth many arguments for 30 years back is well spacing. There is still fire in it, and strong clash of opinion, though in recent years the advocates of wider and wider spacing have seemed to sweep the field in the Mid-Continent and on the Gulf Coast. The Californians have been more conservative.

In state hearings to fix the proper spacing of wells in a new field, it is customary for witnesses to offer estimates of oil recovery. And nowadays, one seems to get in wrong with "Emily Post" if his estimate of total oil recovery from the field is any smaller for wide spacing than for close. Much of the industry has been sold on the idea that even primary recovery is just as great from few wells as from many.

Now this implies that you're going to get more from each well when you space them far apart. That has been the universal experience, other things being equal. Yet, when the theorists attempt to explain why the oil can move farther without using much more energy per barrel, they forget the accompanying requirement of faster flow, altogether. They then assume that the rate of flow into each well will be just as great if the wells are close together. For only on that assumption are their mathematics correct, which seem to justify wide spacing. And that assumption is wrong.

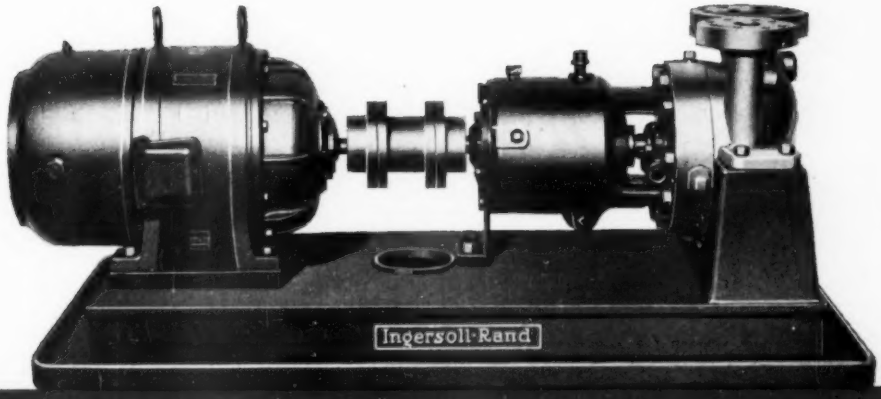
If your engineers are sold on wide spacing, ask them to figure the energy consumption per barrel of oil produced, on the contrary assumption that the natural rate of production is greater for wide-spaced wells and increases as the distance between wells grows greater. That assumption is fully verified by experience.

And if the engineer says, "But we don't produce at the natural rate. The flow of our wells is restricted," then ask him one more question. Ask him what becomes of the energy he saves by restricting production. If the restriction is accomplished by a choke, the supposed saving in energy is represented by the back pressure against the sand. But in each barrel of oil that comes to the choke, what happens to that back-pressure, to that "saved" energy? Is any of it left when that oil hits the stock tanks?

Ask the engineer, too, to figure out how long it will take for oil to reach your well in the center of a 40-acre tract, from the edge of the 40. It's not hard to figure. For example, suppose a well is making 100 bbl. a day from 100 ft. of sand. That's a pretty good allowable, these days. Oil moves into such a well many times faster than into the average United States producing well today.

Assume 20 per cent porosity and 25 per cent shrinkage of the oil between the pay sand and the stock tank. One foot from the center of your well bore that oil is moving only 3 in. an hour. At 330 ft. back, if there's no water drive, it's moving not more than 1/6 in. per day—5 ft. per **year.** And its average speed from the edge of the 40 to the well will be less than that. The journey will take at least 130 years—longer if the well declines. Have you ever had a well that produced 100 bbl. a day for 130 years? With declining rate of flow, 1,000 years is nearer the true time required for that trip.

Engineers bring to court estimates of primary recovery as low as 15 per cent of oil in place. We should be ashamed to admit such inefficiency. What actually happens in such cases is that we recover perhaps 75 per cent of the oil that was in place in a few acres close to the well, and none at



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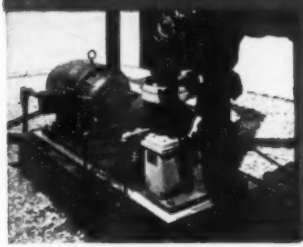

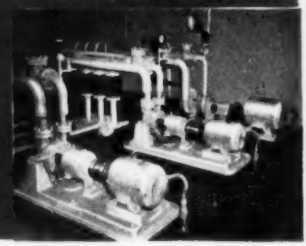

Liquids by the millions of barrels must be moved in a refinery. Centrifugal pumps do the major part of this tremendous job . . . and the Cameron Division of Ingersoll-Rand builds a complete line of centrifugal and mixed-flow pumps for all phases of refinery service.

One of the important types is the single-stage process pump shown above. Built into it are features which assure the reliability and efficiency required for continuous operation under severe conditions.

That's why so many hundreds of these pumps are helping produce aviation gasoline, toluene, butadiene and other petroleum products. Let our engineers tell you more about them . . . and the other pumps in the I-R refinery line.

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all from the other 30-odd acres. It just doesn't have time to get there. And the natural reservoir energy is exhausted before it does.

There are limits, "critical spacing," beyond which closer spacing will be of no avail. There are economic limits, too, for there's a real advantage in the larger recovery **per well** for wide-spaced wells. Primary recovery per **well** increases with increasing distance between wells. But recovery per **acre** diminishes, in the opposite ratio. More wells, on the average, do get more oil. They get it in the proportions noted in 1924 by W. W. Cutler of the U. S. Bureau of Mines: Four wells on the same 40 get twice as much oil as one well will get.

If the extra oil will pay for the other three wells, and then some, they are worth drilling. If it won't, they shouldn't be drilled. But where they would increase the operator's profit (and that means the country's profit, too) and he doesn't drill them, he is leaving half the oil in the ground that he ought to get by primary recovery. He may get it by other methods, but they may be more expensive still. You can't drill these belated in-fill wells to a **deep** sand, the pressure of which has been depleted, and get your money back. That's a game for shallow reservoirs only.

Committee Gathered Data

A few years back the well-spacing committee of the American Petroleum Institute performed an important service to the industry by assembling from many companies detailed engineering data and recovery statistics and estimates from more than 100 oil fields. These included a great variety of reservoirs—in sand, in dolomite, in limestone; fields with natural water drive and fields with none. They ranged in depth from 1,000 to 10,000 ft.

R. C. Craze and Stuart Buckley, Humble Oil & Refining Co. engineers, published* these data, and reported that they could find in them no clear evidence of any relation between well spacing and recovery of oil. However, more than two-thirds of the fields covered were similar to this extent: they were in sand reservoirs and had natural water drive. When these fields are studied separately in groups of limited depth range, the added recovery obtained by close spacing of wells appears very clearly. For example, 28 of these water-drive sand fields lie at depths between 2,500 and 5,000 ft. Eighteen of them had less than 20 acres per well; 10 had more than that. In fact, there were on the average four times as many acres per well in the wider-spaced 10 fields as in the closer-drilled 18. In the wide-spaced group, estimated ultimate recovery averaged only 458 bbl. per acre-foot of pay. In the close-spaced fields, it averaged 900 bbl. That's a 96 per cent increase.

Had the 10 wide-spaced fields been drilled as closely as the others, and obtained thereby an equal recovery per acre-foot, they would have recovered 163,000,000 bbl. more oil than they did. That would have required 2,152 more wells, an average yield of 75,700 bbl. per well. At an average cost of $40,000 per well, they would have had to clear 53 cents per barrel above operating costs to make a profit. Some would have, some would not, at the prices we have had for oil. In some, 10-acre spacing would have been most profitable; in others, 20.

In deeper fields, even at good prices for oil, 40 acres or even more may be best. But the important thing is to recognize that the extra wells do get more oil—that there can be waste in drilling too **few** wells, and not only in drilling too many. The most profitable spacing for the nation, as well as for the operator, is the one that will make the greatest total profit.

Other Secondary-Recovery Factors

It is claimed that you can get the same recovery and more by water flooding or repressuring, or pressure maintenance. These processes do increase recovery. In many cases they increase it greatly. But they do so in close-spaced fields as truly as where the wells are far apart. Wide spacing means that oil has to be moved farther under secondary-recovery methods as well as in primary natural yield. That takes more energy, and energy costs money.

Can secondary processes be used as a substitute for closer spacing and get the same results **at less expense?** There's the practical question. These great gas-injection plants cost money—money by the million. They cost so much that we hear it said that, of the many great recycling plants which have been installed in distillate fields, not one has yet paid out, or is even sure of paying out.

Wide spacing wastes energy, whether it be primary reservoir energy or the energy you pay for when you force gas or water into the sand in secondary recovery. And this waste is not just "peanuts." It is vast. If the wide-spacing vogue of the past 20 years has placed the average well even 50 per cent farther from the neighboring wells than the distance that would have yielded greatest profits, at least 10 billion barrels of oil—ten thousand million barrels—has been left underground that could have been produced at a profit in primary recovery. If the same practices continue, the ultimate loss in the United States alone could reach several times that figure, and in the world, to hundreds of billions of barrels.

Secondary methods will get some of it. Some of it is forever lost because of too-wide spacing. These are our lost reserves. We are still adding to them by the same mistaken practices. Wide spacing is being preached, even in the movie, "Tulsa."

Fortunately, some operators have not fallen for wide-spacing propaganda. The common sense of many independents, their reliance on actual experience instead of on erroneous theory, has kept them on the right track. The nation's oil reserves are greater than they would otherwise have been. In California, thanks to an overwhelming mass of experience proving greater recovery, and greater profit, from close spacing, few operators, large or small, have been sold on the opposite idea. It is said that 80 per cent of the nice increase in California's oil reserves since the war has come from additional drilling in old producing areas.

*See The Oil and Gas Journal, August 24, 1946, p. 97 et seq., R. C. Craze and S. E. Buckley, "A Factual Analysis of the Effect of Well Spacing on Oil Recovery."

New Well-Spacing Orders Affect Michigan Oil Pools

Diagonal 20-acre spacing for wells in Stony Lake Traverse field of Oceana County, and Mt. Forest Dundee field in Bay County, Michigan, was announced by P. J. Hoffmaster, supervisor of wells, following a public hearing of the Michigan Oil Advisory Board in Lansing May 25. These fields had been developed on a 40-acre pattern.

A well allowable for Stony Lake field wells was also established following the hearing. Each 40-acre tract will be allowed to produce 100 bbl. of oil a day. If there is one 40-acre well on the unit it will be permitted to make the full 100 bbl. allowable. If there are two 20-acre wells on the unit each will be restricted to 50 bbl.

The rule restricting drilling below 1,700 ft. in 12 Southwest Michigan counties on units smaller than 20 acres was abolished and wells will now be "permitted" on conventional 10-acre units in this area.

Revision of Unit Agreement On Federal Lands Drafted

WASHINGTON.—The Interior Department has drafted a revision of its unit agreement for the operation of oil and gas leases on federal lands and made copies available to the industry, inviting comments to be submitted by August 1.

The new text, it was explained, is a revision of the form of agreement approved by the department January 17, 1947, and embodies some of the proposals submitted by members of the oil industry and certain modifications and changes suggested by staff members of the U.S.G.S.

Copies of the new form may be obtained from the Geological Survey in Washington or its offices in Tulsa, Casper, Wyo.; Roswell, N. M.; or Los Angeles. Comment and suggestions should be addressed to the director in Washington.

for the BIG LIFT

GUIBERSON "J" SWAB CUPS ON THE FAMOUS "K" FRAME

Designed Specifically for Fast Unloading of Deep, Wet Wells

No well is too deep or too wet for Guiberson "J" cups on a "K" frame — the toughest, out-liftingest swab assembly anybody ever ran in a well. It will lift everything but the tubing out of the hole. The "J" swab cup keeps on swabbing and unloading where conventional swabs fail. This swab cup has the durability formerly thought impossible. It drops fast and is very smooth running because of its heavy reinforcement and there is no tendency to down swab or hang up in collars. Fits "K" mandrels, thimbles and sleeves; has the same quick dressing accessibility as the "K," and if desired "J" and "K" cups can be run together on the same frame.

Nominal sizes: 2", 2½" and 3". Get them from your favorite supply store.

- Extra heavy reinforcement for long trips and easy sliding up the tubing with a load.
- Long, flexible lip — better up-stroke seal.
- Wires are molded into the cup for greater strength.
- Oil-resistant, abrasion-resistant compound.

The Time-Tested Principle of the Basket-Reinforced Flexible Lip

Guiberson cups of the basket type, with flexible lips and strongly reinforced walls, have been proving their worth for many years in every type of swabbing and packing job. The "J" swab cup is a refinement of this principle, molded of the toughest oil-resistant compound known.

"THE 'J' CUP OUT-PERFORMS ANYTHING I EVER SAW!"

"The 'J' cups have proven to be the best we ever used," says one South Texas operator. "We lifted fluid containing over 10% sand in 2" tubing from 4000' depth and these new cups made 10 runs to one run made by the previous swab." An Oklahoma well servicing company says, "This 6500-foot well afforded us an excellent test. Lifting an average of 500' of fluid per trip in 2½" tubing this 'J' cup made five and six trips to one of another type."

Specify Guiberson for EVERY SWABBING REQUIREMENT

"K" Tubing Swab With "K" Cups | "K" Tubing Swab With "J" Cups | "K" Tubing Swab With "J" and "K" Cups

SAFE THAN SORRY — BETTER BE GUIBERSON

Reg. U.S. Pat. Off.

THE "K" SWAB CUP

Flexibility combined with great strength is the "secret" of the exceptional effectiveness of all Guiberson swab cups. The cup lip relaxes going in the well, is relieved of wall contact and drops freely. The cup expands under pressure of the fluid column when the swab is started up the hole, to pull the maximum load every trip.

Nominal sizes: 1½", 2", 2½", 3", 3½", and 4". Get them from your favorite supply store.

- The Type "K" Tubing Swab with "K" cups will handle 90% of all tubing swabbing. Quickly accessible for fast, easy dressing.
- Using the same "K" frame, but with "J" cups, this versatile assembly will unload the deepest and wettest wells. A heavy duty assembly, not meant for light loads.
- Dressed with one "J" cup and one "K" cup, the "K" swab will not only lift a very heavy load, but will pick up the last cupful of fluid at the lowest level.

***Every Swabbing Need* IN TUBING CAN BE MET WITH ONE OF THESE THREE "K" ASSEMBLIES**

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KEEP YOUR CASING STRING WHERE IT BELONGS

...Centered

Ten strong spring staves . . . 3/16" thick x 1½" wide . . . riveted to the rugged end rings of the Larkin Centralizer keep your casing in "bulls-eye" position in the hole. They center your pipe with four times the strength of an ordinary centralizer because there are twice the number of staves and each stave, due to its shorter arc, has twice the centering strength. Larkin's 10 staves work as a unit . . . not individually.

The stagggered stave position provides 10 points of contact, and a much greater peripheral bearing on the wall of the hole. Casing may be rotated while the centralizer remains stationary . . . no damage to tool or well bore. The Larkin Centralizer is always pulled, not pushed, through hole restrictions.

Always specify a Larkin Centralizer " . . . THROUGH YOUR SUPPLY STORE."

LARKIN

...Through Your Supply Store

Easy to install. Just slip on and plug-weld the lugs inside end rings as shown. "Tailor-made" to hole size. No on-the-job adjustments necessary.

LARKIN PACKER CO., INC. • ST. LOUIS, MO.

POWER REQUIREMENTS

For Rotary-Drilling Operations

by R. W. Craig*

FOR some time there has been a general rule in the industry that a rotary-drilling rig should be powered to the extent of 100 hp. per 1,000 ft. of depth rating for efficient operation. General practice and field observations indicate that this rule applies for hoisting operations and for average requirements for the mud pumps but that for the larger-diameter holes more power than designated by this rule is advisable.

Most drilling operations are performed with 4½-in. drill pipe and taking into account, tackle, drill collars, and floating effect, 20 lb. per ft. of the drilling string is a close approximation of the weight which the hoisting equipment is called upon to handle. A drilling rig rated at 10,000 ft. must hoist a 200,000-lb. string of drill pipe, a rig rated at 12,500 ft. a 250,000-lb. string, and so on. With most manufacturers of drilling machinery it can be considered that the equipment is suitable for at least 25 per cent beyond the depth rating.

With reference to draw-works design it is preferable that the rated loading of drill pipe can be hoisted in the third or fourth speed (a speed ratio about halfway between low and high). A 12,500-ft. draw works and drive group equipped with four 300-hp. engines hoists its rated string of 4½-in. pipe in approximately 50 seconds net per 90-ft. stands or allowing 50 seconds for breaking, setting back, and lowering the blocks, the stands can be set back in about 100 seconds each, at rated depth. The average for the string will be about 80 seconds per stand and coming out of the hole from 12,500 ft. requires around 3 hours. (See Table 1.)

The smaller rigs if powered on the basis of 100 hp. per 1,000 ft. depth rating, also average close to 80 seconds each to set back stands at rated depth. The rule of 100 hp. per 1,000 ft. permits hoisting drill pipe at these acceptable speeds. On any rotary drilling rig 1 minute per stand when going in the hole seems to be an established figure.

A number of engines of about the same cubic displacement and rated speed have been popular on the heavier-duty rigs. When these engines are compared on the basis of 75 lb. b.m.e.p., for most practical purposes, it seems that they can be considered as producing about the same power each. In fact, it has been convenient to refer to most of them as "300-hp. engines" and on most drilling rig applications these engines are called on to produce power at the rate of 300 hp. at least momentarily when picking up the drill-pipe loads.

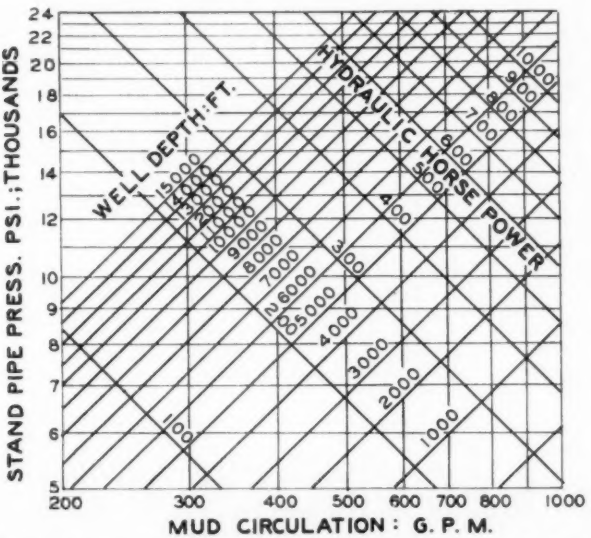
The quantity of these 300-hp. engines powering a drilling rig has come to be a suitable measure of the depth rating of the rig. Two engines comprising an adequate hoisting plant for a 7,500-ft. rig, three engines for 10,000-ft. drilling, and four engines for a 12,500-ft. rotary outfit. The power of these rigs has been such that 90-ft. stands of the rated string of 4½-in. drill pipe could be hoisted in 50 seconds and the full string in accordance with rating of the rig could be set back at an average of 1¼ minutes each.

Some of the popular smaller engines have been classed as "225-hp. engines" and have been considered adequate for rigs rated at 5,000 ft. A drive group including three of these engines has constituted a good power plant for rigs rated at 7,500 ft.

TABLE 1—HOISTING TIME FOR ROTARY RIGS OF SEVERAL DEPTH RATINGS

Rating of rotary rig (ft.)	Engines, hp.	Time to hoist full string 90 ft. (seconds*)	Average hoisting time per stand (seconds)	No. of 90-ft. stands in string	Approximate time to come out of hole (minutes)
5,000	2-225	50	80	55	75
7,500	2-300	55	85	85	120
10,000	3-300	50	80	110	145
12,500	4-300	50	80	140	185

*These figures are approximate and are based on engine horsepower shown and 70 per cent over-all efficiency.



Hydraulic horsepower required to pump 80-lb. mud through a 4½-in. full-hole string

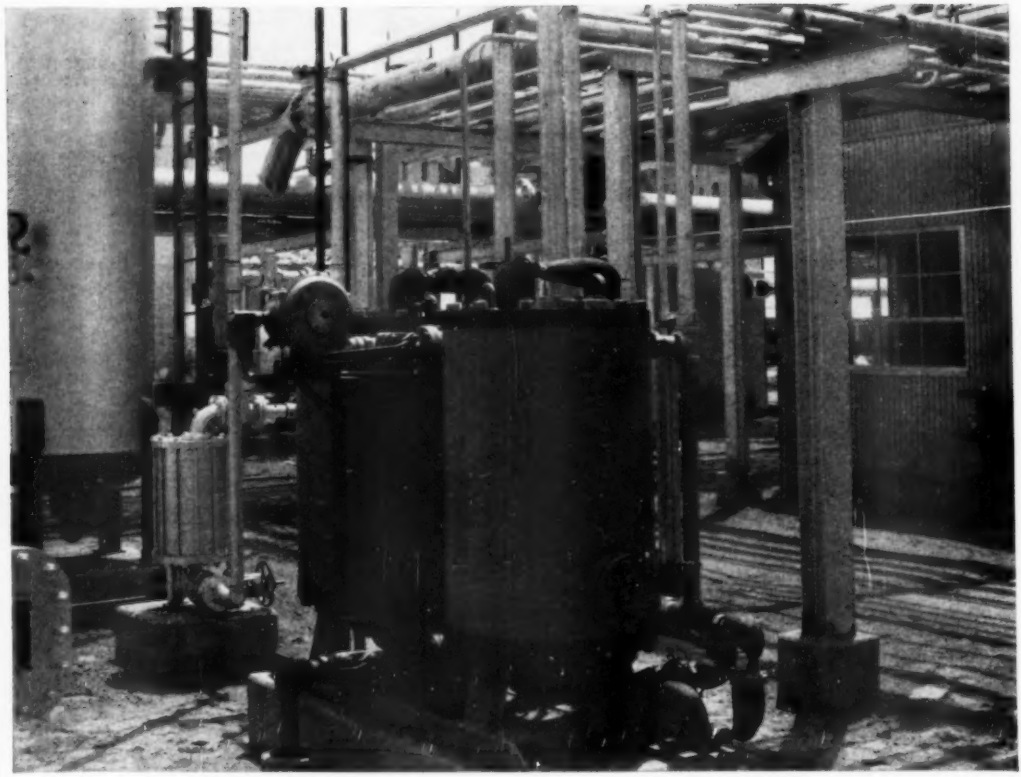
Power for Mud Pump

Again referring to the general method of rating a rotary drilling rig at 100 hp. per 1,000 ft., the pumps require two-thirds of the engine power. That is on the usual three-engine rig, two engines (600 hp.) serve to power a mud pump. On deeper wells when drilling 11 and 12¼-in. holes this is insufficient power to maintain a desirable upward mud velocity of 3 ft. per second. Referring to Table 2, note that two-thirds of the engine horsepower will permit drilling only a 9⅝-in. hole to the rated depth of the rigs and still maintain this upward mud velocity of 3 ft. per second at that depth.

When 11 or 12¼-in. diameter holes are drilled at depths of 8,000 to 12,000 ft. and 2½ to 3 ft. per second upward velocity of the mud is expected, greater power than 100 hp. per 1,000 ft. of depth is required. In order to provide

(Continued on page 134)

*Engineer, National Supply Co., Torrance, Calif. Portion of paper presented at A.P.I. Pacific Coast District, Division of Production meeting, Los Angeles, May 12, 13.



Lectrodryer keeps instrument air DRY and CLEAN at new Sid Richardson plant

Dependability! Builders of this new gasoline plant made certain of that by heading off trouble before it starts. Compressed air fed to instrument air lines is kept DRY and CLEAN by the Lectrodryer and Lectrofilter you see above.

Lectrodryers are old hands at this job. Controls in refineries, chemical processing plants and power generating stations are smoother operating, more dependable, because of Lectrodryers. They catch the *vaporous* moisture which after-coolers, filters and separators let slip by.

No freezing of outdoor air lines. No clogging of delicate ports with rust or sludge.

Lectrodryers are charged with Alcoa Activated Alumina, which removes every trace of moisture to dewpoints below -110° F. One column is re-activated while the other is DRYing, a function which goes on efficiently year after year. For a copy of Bulletin 216, picturing the many services Lectrodryers perform, write Pittsburgh Lectrodryer Corporation, 325 32nd Street, Pittsburgh 30, Pennsylvania.

Lectrodryers are sold in Oklahoma and Kansas by The Condit Company, 1011 S. Main St., Tulsa 3, Okla.

LECTRODRYERS DRY
WITH ACTIVATED ALUMINAS

LECTRODRYER

REGISTERED TRADEMARK U.S. PAT. OFF.

Absorption and stripping towers (at right) and fractionating equipment (left) are compactly grouped around the pump-control house. Beyond the building are two 400-psi. boilers and the feed-water-treating plant. Buildings in foreground are temporary workshops

by D. H. Stormont

Sid Richardson's *New Gasoline Plant*

Designed for 75 Per Cent Propane, 85 Per Cent Butane Recovery

Completion of Sid Richardson Gasoline Co.'s highly efficient, modern, natural-gasoline plant in Keystone field of West Texas resulted in the complete elimination of gas wasting in that field. Through design and use of propane refrigeration, about 75 per cent of the propane and practically all butanes are being recovered from the raw field gas. The plant was placed in operation in April, but minor construction jobs and clean-up activities are still under way.

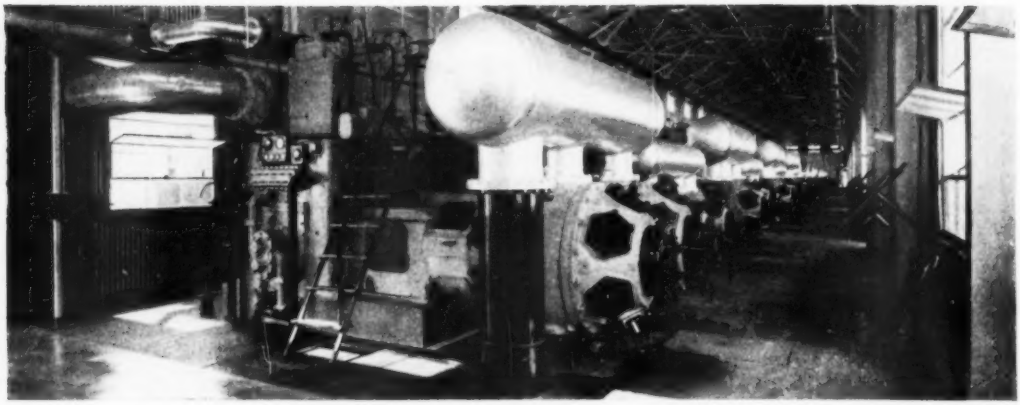
WITH the completion of Sid Richardson Gasoline Co.'s new natural-gasoline plant in Keystone field of West Texas, flaring of field gas has been entirely eliminated. And since provisions were included for its capacity easily being expanded to 115,000 M.c.f., it is expected the plant will care for the field's needs for years to come.

Designed for a butane recovery of 98 per cent and a propane recovery of 75 per cent, the plant is one of the most efficient in West Texas. To achieve this relatively high yield of butane-propane fractions, lean oil is removed at two levels in the two main absorbers, passed through propane chillers and returned to the absorbers. Propane refrigeration also is utilized to reflux the deethanizer, and for final condensation on the still overhead vapors to give maximum retention of propane and butane absorbed by the absorber.

Provisions have been made for selling propane, propane-butane mixtures, and grade gasoline by truck or tank car. Residue gas above plant and field requirements is sold to El Paso Natural Gas Co.

Gas-Stripping Cycle

Under initial operations 15,000 M.c.f. of 600-psi. field gas is run through an inlet scrubber and passes direct to the two absorbers. In addition about 40,000 M.c.f. of low-pressure gas is boosted in three stages from 1 psi. intake to a discharge pressure of 600 psi. For compressing this low-pressure gas eleven 1,200-hp. gas-engine-driven units have been installed. In addition, stubs have been provided in the intake and discharge headers for the installation of eight more compressor units. Thus it is expected that compression facilities eventually will total 22,800 hp. At that time with a slightly higher intake pressure, 90,-

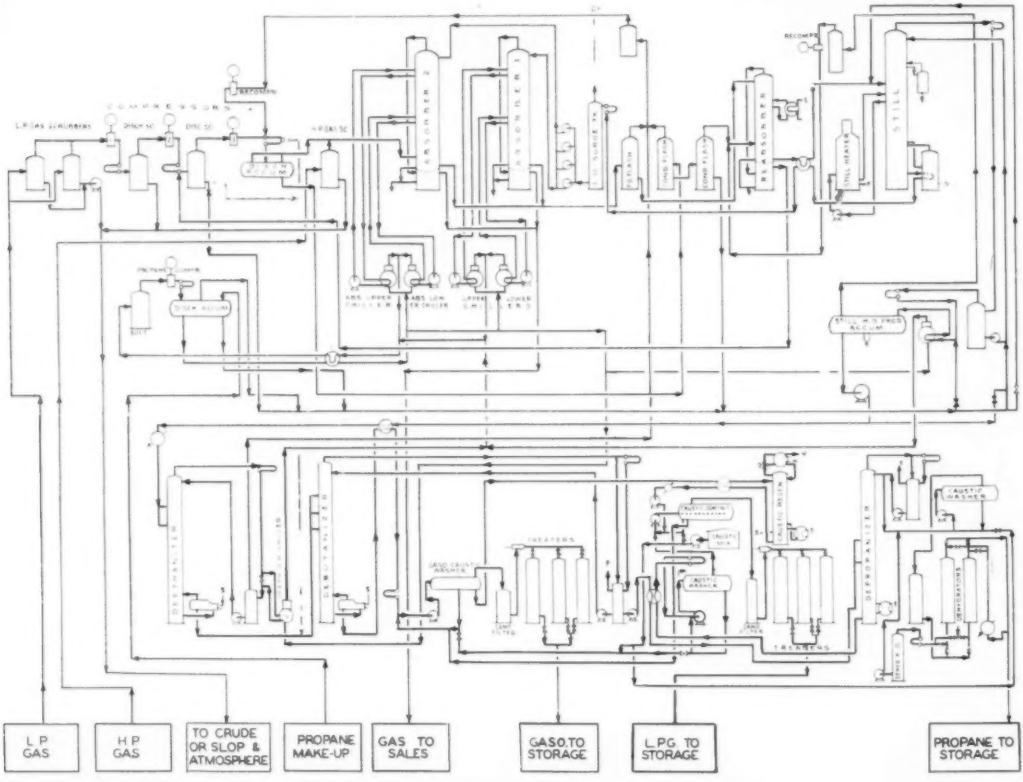


Looking down the line of eleven 1,200-hp. compressors used to boost low-pressure field gas to a discharge pressure of 600 psi. in three stages

000 M.c.f. of low-pressure gas can be handled, plus 25,000 M.c.f. of high-pressure field gas.

Compressed gas from the high-stage discharge accumulator joins the scrubbed 600-psi. field gas and goes to two high-pressure absorbers. One tower is 7 ft. in diameter and the other 5 ft.; both contain 22 trays and are 70 ft. high. Stripped gas is then taken overhead, passed through integral gas scrubbers in the bottom of the columns, and sold to El Paso Natural Gas Co. for movement through its Arizona-California pipe line. A small portion of the residue is also used for gas lifting in Keystone field.

Circulation of lean oil over the absorbers is maintained by four six-stage, 330-g.p.m. centrifugal pumps driven by 250-hp., 3,500-r.p.m. steam turbines. Partially enriched oil is removed from an accumulator section above the twentieth tray, chilled from



Flow diagram of the recently completed natural-gasoline plant

ACID TEST of Performance

...never two problems exactly alike

A successful record in the refinery field is a reliable measure of engineering and construction ability.

Problems of design, as well as those of supply and field organization, yield readily to experience.

The wide variety of oil processing plants engineered and built by Bechtel refinery men show how well the organization is manned and equipped for this type of work—in any size, at any location the world over.

Bechtel Corporation takes complete responsibility, from preliminary study to operating plant.

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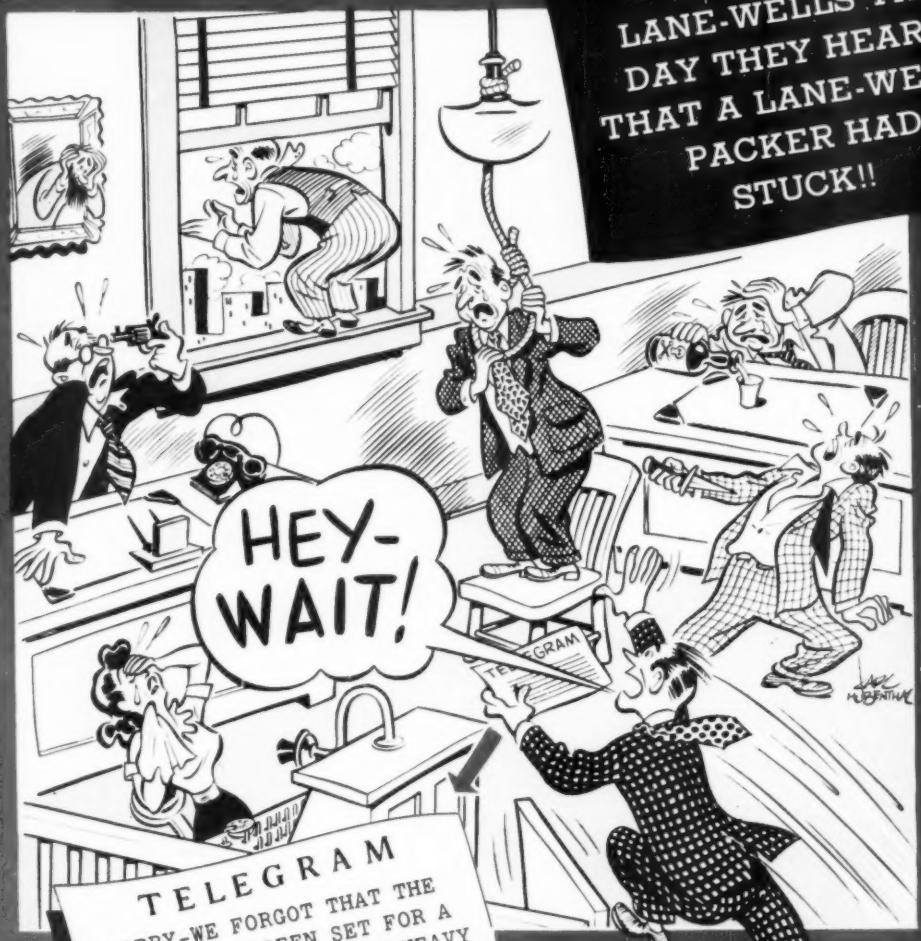
SCENE AT LANE-WELLS THE DAY THEY HEARD THAT A LANE-WELLS PACKER HAD STUCK!!



TELEGRAM

SORRY-WE FORGOT THAT THE PACKER HAD BEEN SET FOR A YEAR AND A HALF WITH HEAVY MUD IN THE ANNULUS ABOVE IT. AFTER WE CIRCULATED OUT HARDENED SETTLINGS, PACKER WAS PULLED WITHOUT TROUBLE, AND IS STILL IN GOOD SERVICE CONDITION.

Lane-Wells Packers don't stick, because the FLOSEAL Packing Rings withstand heat and pressure, and don't vulcanize to the casing. Also, the crosscut slips are dovetailed—can't catch, drag or hang-up in collars. Ask the Lane-Wells man for the full story.

LANE WELLS for Packers

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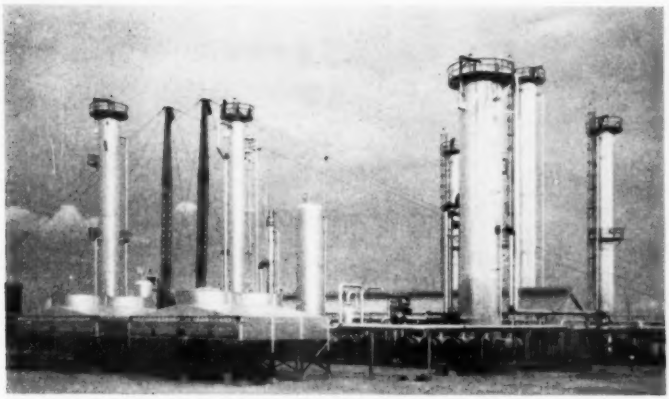


To provide reflux for the 20-tray still (right foreground) a portion of the overhead vapors are passed through these two radiator-type coolers. The oil-to-oil heat-exchanger battery is in front of the still

about 90° to 50° F. and returned to the other side of this divided section. On the eighth tray this oil-cooling process is repeated. This intercooling of absorption oil is accomplished by propane refrigeration in shell-and-tube chillers with the oil making eight passes through the chiller.

Each of the two chillers for the 5-ft. absorber has a cooling capacity of 2,168,000 B.t.u. per hour. Each of the two chillers for the 7-ft. absorber have a cooling capacity of 4,337,000 B.t.u. per hour. Initially, 600 hp. is utilized for compressing vapors from the propane chillers.

Rich oil is removed through liquid-level controls in the bottom of the two absorbers, at about 80° F., and the two streams united. After passing through a fat-oil flash tank at 385 psi., the oil is run to the top tray of an 8-ft. o.d., 27-tray reabsorber. This tower, operated at 200 psi. and a bottom temperature of 120° F., is in effect a rich-oil stabilizer as it operates to eliminate most of the methane and ethane gases from the oil. Heat for this stripping action is supplied by recycling oil by thermosyphon from the eleventh tray through a steam-heated external reboiler.

Condensate knoked out in third-stage compression (600 psi.) after being flashed in series at 385 and 200 psi., is charged to a 10 by 62-ft. still. Vapors flashed in the 385-psi. tank join those flashed from the fat oil at 385 psi. and those from the deethanizer reflux tank, and all are recompressed to 600 psi. and again run through the high-pressure absorber. Light ends from the 200-psi. flash tank are joined by the uncooled recompressed vapors from the still overhead product accumulator, and charged to the bottom of the reabsorber.

Rich oil from the reabsorber passes through a battery of eight oil-to-oil exchangers, where the hot lean oil raises the fat-oil temperature from 120° to 350° F., and enters the still on the twelfth tray. Heat for the stripping operation is supplied by a gas-fired oil heater rated at 36,200,000 B.t.u. per hour. Stripping is carried out at a pressure of 115 psi. and a bottom temperature of 500° F. is carried on the 20-tray tower.

Stripping steam in amount of 0.19 lb. is used per gallon of lean oil circulation. In the top of the still are eight trays which serve as the dephlegmator section.

Circulation of oil to the heater is automatically accomplished by means of a compartmental tray installed between the tenth and eleventh trays. Difference in the levels of two weirs contained in this tray permits the rate of oil circulation to the heater to operate independently of the rate fat oil is being pumped into the tower.

In place of conventional water cooling, air-fin coolers are used for condensing sufficient quantities of the still overhead vapors to supply the required reflux. These air-fin coolers, four-pass fin tubes with draft provided by four 10-ft. fans, have a rated cooling capacity of 20,489,000 B.t.u. per hour.

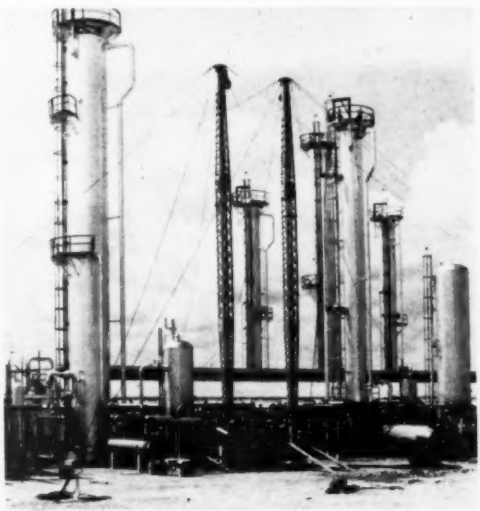
Still vapors not condensed for reflux first pass through atmospheric cooling coils, then through a propane chiller where their temperature is dropped to about 55° F. Any vapors not condensed in the chiller are removed in the product accumulator, recompressed, and recycled to the reabsorber as explained earlier.

Fractionating and Treating

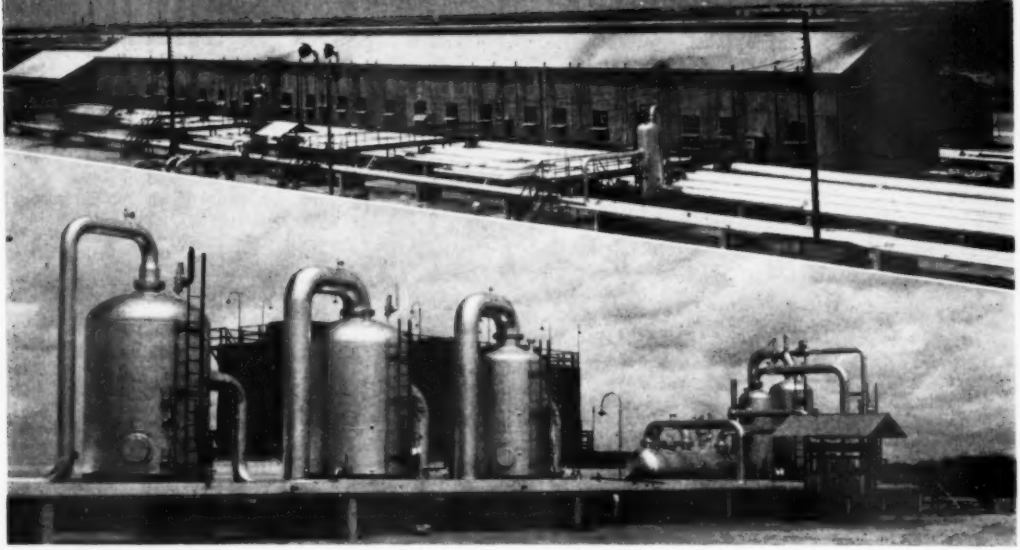
Fractionation of the raw still product into propane, L.P.G., and grade gasolines is carried out in a conventional deethanizer, debutanizer, and depropanizer. Overhead vapors from the deethanizer, averaging about 71 per cent methane and ethane with the remainder almost entirely propane, are passed through atmospheric-type condensers and then taken to the propane chiller. By means of this chilling, temperature of the tower reflux is held at about 70° F.

Grade gasoline removed from the bottom of the debutanizer is caustic washed at 90° F., passed through a sand filter, and then run through a copper chloride treating unit. Either 100-lb. L.P.G. or commercial butane is taken from the bottom of the depropanizer, caustic washed for removal of the hydrogen sulfide content, and passed through a second caustic wash where 80 per cent mercaptan removal is accomplished. Caustic from the grade gasoline, caustic washer, and from the L.P.G. second caustic washer is passed through a caustic regeneration unit for removal of mercaptan. The removal of this mercaptan takes considerable load off the copper chloride treaters.

The butane or L.P.G. is then passed through a sand filter and given final treating in a L.P.G. copper chloride



Erection of a second main absorber is under way at the Keystone plant. Propane chillers for intercooling the absorption oil are shown at right of the tower's base. The column at left of the gin poles is the reabsorber and rich-oil stabilizer



Top: Compressor building, housing eleven 1,200-hp. gas-engine-driven units, with the generator building at left. Compression capacity is to be expanded this year through installation of four units. Nine more may be added if warranted. Below: Interstage gas scrubbers (left) and inlet scrubbers and accumulator for the low-pressure field gas. Tower in background is used primarily for interstage gas cooling

treater. Propane in excess of requirements for making L.P.G., after being caustic washed and filtered, is dehydrated in bauxite-packed towers and run to storage.

All small process pumps, cooling water pumps, and gasoline loading pumps are motor driven. All large process pumps are steam-turbine driven.

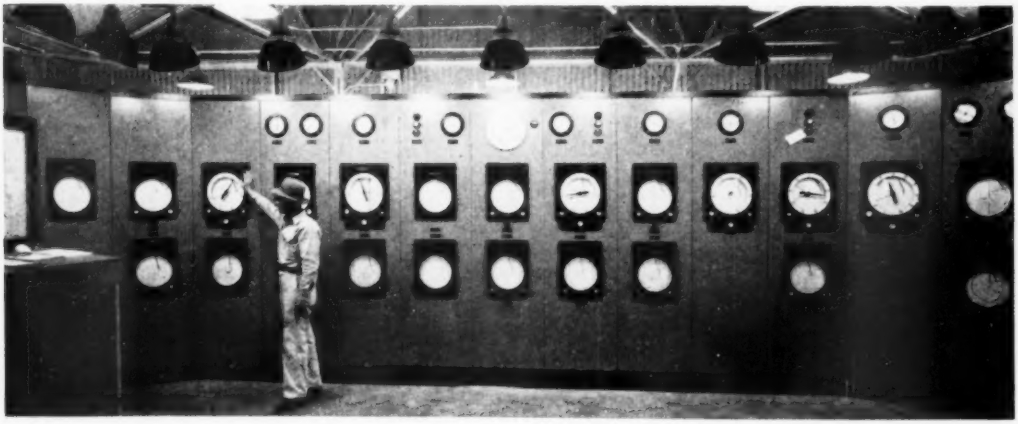
Cooling Facilities

Cooling of the process streams is carried out in a six-cell (four bays each) induced-draft cooling tower, and interstage gas cooling is accomplished in a separate four-cell tower. The larger tower is designed to remove about 75,000,000 B.t.u. of heat per hour in cooling the water from 95° F. to 80° F. at a wet-bulb temperature of 71° F. The four-cell tower cools water from 100° to 80° F., removing some 52,000,000 B.t.u. per hour. Cooling of process streams is done by atmospheric coils in the towers. Newest type vertical coils do the cooling.

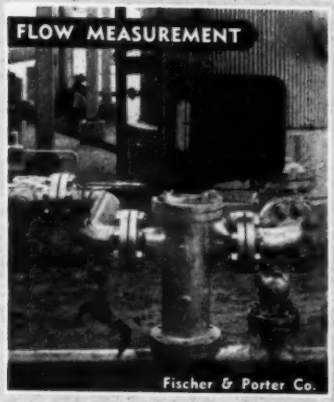
Two vertical centrifugal pumps, driven by 110-hp., 1,200-r.p.m. electric motors, are used for pumping about 10,000 g.p.m. of water over the large tower. At the smaller tower some 5,200 g.p.m. are pumped by two 40-hp., 1,500-r.p.m. motor-driven vertical centrifugals. At both towers one additional unit is installed in a stand-by capacity.

The circulation water for both cooling towers is treated with sulfuric acid, corrosion-prevention compound, and stabilization chemical. Water character and pit concentration are controlled by periodical tests, simplified for operator's use and rechecked daily by the plant laboratory.

Cooling of jacket water from the 11 compressor units and four engines in power-generating service is through six radiator-type coolers. The cooling water flows in a closed circuit. Make-up water is steam condensate. Water to the engines is maintained at a constant inlet temperature of 145° F., being cooled from 157° F. Circulation of jacket water is maintained by two 5,500-g.p.m. vertical pumps driven by 100-hp., 1,200-r.p.m. motors. One 3,300-g.p.m. pump driven by a 60-hp. motor circulates water through the lube-oil coolers. The water is cooled by atmospheric coils. When the additional compressor capacity is installed to bring the jacket-water load to 16,165 g.p.m., one additional



Instrument board for Sid Richardson plant, located in building which houses process pumps



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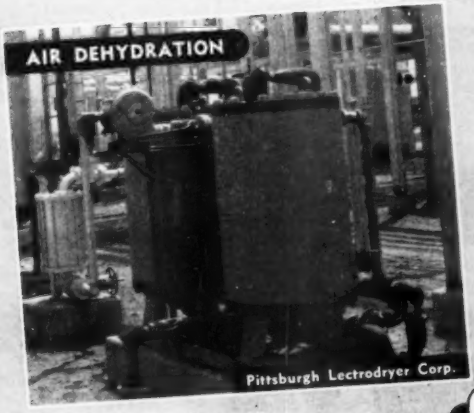

Equipment for the Process Industries

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5,500-gal. centrifugal unit will be added.

Cooling of lube oil from these compressors and generator units is accomplished in individual shell-and-tube exchangers. For circulating the cooling water to the atmospheric coils on the water, two 1,800-g.p.m. centrifugals are used. These are driven by 30-hp., 1,500-r.p.m. motors. For conditioning and filtering the lube oil, six oil cleaners are used. Normally, at about 48-hour intervals the oil from each engine is circulated through an oil purifier.

Steam Generation

Facilities for providing the plant's steam requirements consist of two water-tube boilers, each rated at 42,000 lb. per hour of 400-psi. steam with about 225° superheat, giving 675° steam. The boilers are equipped with induced-draft fans powered by 20-hp. motors. Sour gas, averaging 150 grains of hydrogen sulfide per 100 cu. ft., is used as fuel.

The steam system is balanced so that no excess exhaust steam will have to be condensed. All of the steam from the boilers is expanded from 400 lb. at 675° through turbines driving these large process pumps; that is, the three lean-oil pumps, the deethanizer feed pump, the rich-oil-to-heater pump, and the boiler-feed pump. There are two exhaust steam systems, one at 130 lb. and one at 110 lb. Exhaust steam from the boiler feed pumps and from the three lean-oil pumps goes into the 110-lb. system. All of this 110-lb. steam is used for reboiler and preheater requirements for the fractionators. Virtually all the 130-lb. exhaust from the deethanizer feed pump and from the rich-oil heater pump goes directly into a lean-oil reconditioner, and then into the bottom of the rich-oil still. Excess 130-lb. steam above the still stripping requirement goes into the 110-lb. exhaust system. Also, a small amount of 400-lb. steam is put into the 110-lb. system to maintain a constant pressure. Cold condensate from the still overhead reflux's accumulator and from the still water leg is put through a small perforated plate tower, wherein a small amount of sweet gas is used to drive hydrogen sulfide from the condensate before it goes back to the boiler plant. The 110-lb. condensate goes directly to the boiler plant.

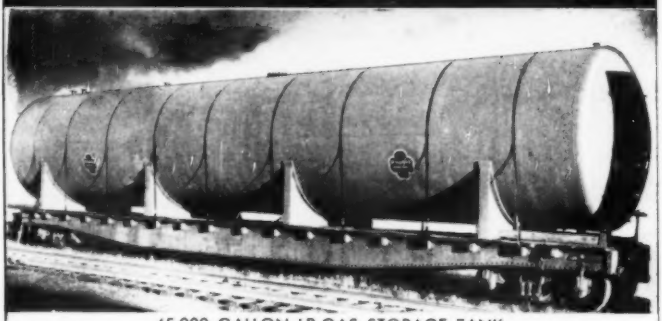
For providing treated makeup water for the boilers, a hot process lime-soda water-treating system is used. Raw water, supplied by three wells, has a total soap hardness of 55 p.p.m., a calcium hardness of 50.4, and a total solids content of 128 p.p.m. Silica content, as SiO_2, averages about 26 p.p.m.

Raw water from a 10,000-bbl. storage tank is treated by the hot lime-soda process, to remove all deposit-forming compounds, and with magnesium oxide to remove the silica. The treated water flows to a cone-bottomed sedimentation tank where solids are removed through the bottom. From here it passes to a treated water storage tank where disodium phosphate for stabilization is injected. The water is then passed through an Anthrifilt filter before being charged to the boilers by a 100-hp., 150-g.p.m. turbo-pumping unit, or the standby motor-driven unit of the same rating.

Operation of the treating is entirely automatic. The amount of soda ash and magnesium oxide added, once set, depends upon the rate raw water is charged to the treating system. This is accomplished through a recorder-controller operating in conjunction with counters and timers. The amount of phosphate added is automatically controlled by the volume of water leaving the hot lime-soda effluent.

To assure that any organic compounds present in the treated water will be kept in a "fluid" state, beta-glucoside is added as a reactive colloid at the discharge of the boiler feed-water pump. As an aid in determining the amount of organics present in the boiler water, sulfo-glucosate is also added. The latter is used primarily as a tracer for the beta-glucoside to make possible a more rapid laboratory determination of the organic content.

STORAGE VESSELS now a production line item at McNamar



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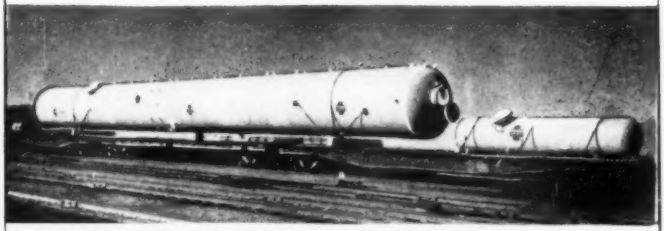

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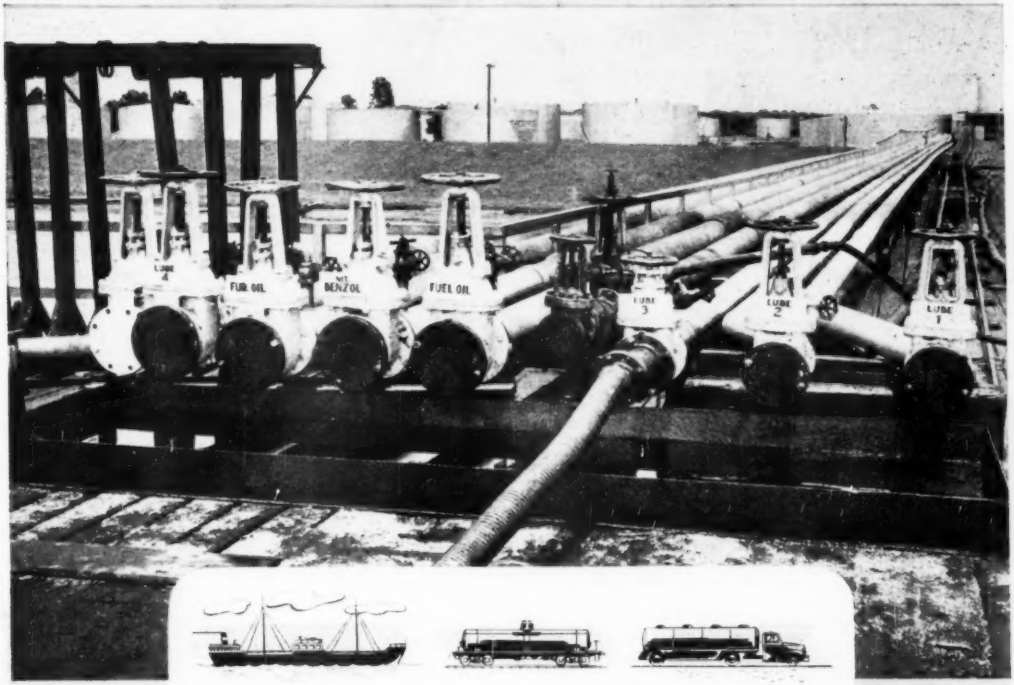

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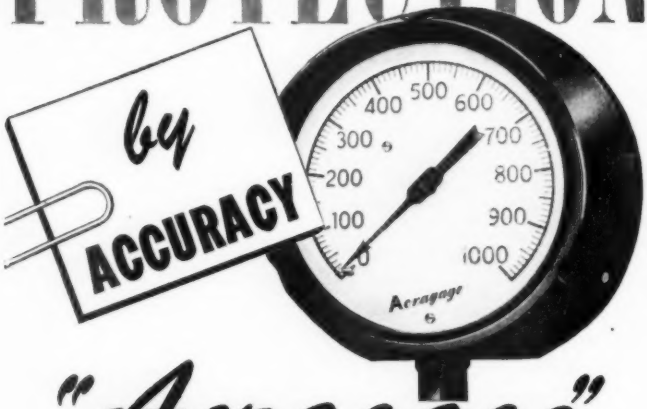

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Auxiliary Facilities

Power requirements are supplied by four engine-generator units housed in a separate building at one end of the compressor plant. The engines are four-cycle, eight-cylinder, 450-hp., 450-r.p.m. units. These drive 300-kw., 480-volt, three-phase, 60-cycle generators. Additional units will be installed when the plant's compression capacity is enlarged.

For storage of finished products, three 3,000-bbl., 100-psi. L.P.I. spheres have been erected, three 15-psi., 5,000-bbl. spheroids for storing grade gasolines, and six 200-psi. blimps totaling some 10,000 bbl. capacity for propane. At the plant site a four-spot, diamond-shaped truck-loading rack. On a spur on the Texas & New Mexico Railroad, 4 miles west of the plant site, a 20-double-spot tank-car loading rack was erected.

All lines in the plant yard are aboveground, either on overhead supports or resting on concrete pillars. The two main gas lines leading in from the field are 26 in., and are joined together to form a 36-in. header from which the low-stage compressor cylinders take suction. Waste products and water run to a sump from which a sump pump automatically lifts them to a 250-bbl. vertical tank equipped for oil skimming. A 6-ft. cyclone wire fence is erected around the plant yard, with a 30-in. corrugated aluminum skirt.

A thoroughly modern laboratory is a part of the tile office building. In the laboratory, all chemical control work, product testing, and charcoal analysis are handled.

Complete coverage of the plant with fire-fighting equipment of the latest design has been strategically laid out. There are two fire pumps, one motor driven, the other gas-engine driven, with a source of gas which comes in from the high-pressure field gas, and is independent of any gas-line failure within the plant itself. Both pumps take suction from the 10,000-bbl., raw-water storage tank, and discharge into an underground distribution system by a small pump taking suction from the same water tank and discharges at 50-lb. pressure. When a fire hydrant is suddenly opened, this small pump has insufficient capacity to maintain pressure on the system, thus the pressure falls off rapidly, and a pressure-actuated electric switch automatically turns on the motor driving the big fire pump.

The plant was designed and constructed by Jones & Laughlin Supply Co., engineering and construction division. G. H. Billue was construction superintendent for Sid Richardson Gasoline Co. and is acting as plant superintendent. H. H. Jones is chief engineer, George Ellis is process engineer, and B. C. Smith is chief chemist.

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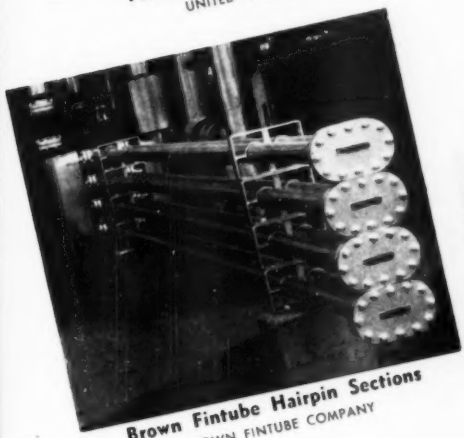

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New centralized shops of Humble's Baytown refinery neared 70 per cent completion when this recent photo was made. Eventually building will cover pipe yard in background of picture

Humble Central Shop One of Nation's Best

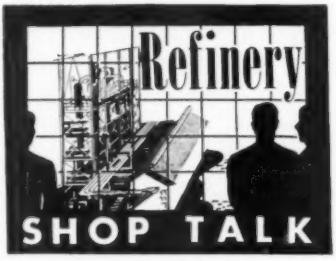
A SECTION of the new central shop building at the Baytown refinery of Humble Oil & Refining Co. is scheduled for occupation this month. The new building which will house the personnel and much of the equipment employed in the upkeep of the refinery covers an area of 2¼ acres. Architectural design of the new shop building includes brick and corrugated asbestos outside walls on its steel frame, soundproofed partition walls and glass-wool insulation for the roof and exterior walls. Specifications on the roof call for a combination of galvanized metal lath, glass-wool blanket, 4-in. light rock slabs, and asphalt-treated felt.

Thoroughly fireproof, the new shop building is air conditioned and is illuminated with mercury-vapor and incandescent lamps. Its equipment is of the most modern type and the tools which it houses are the best available. The new layout provides more working space than the previous shop facilities at Baytown. Ultimately all of the mechanical crafts and other skilled personnel will be located in the new building. Office space is to be partitioned off and the building will be divided into working space for pipe fitters, machinists, welders, insulators, carpenters, instrument men, electricians, bricklayers, painters, blacksmiths, tinners, and the other groups of specialized personnel employed at the refinery.

Centralization of the various shops into one building provides the refinery with maintenance and construction facilities, which for either emergency or routine operations, is of high order efficiency. Each working section of the new shop is equipped with overhead cranes with runways the full length of the section. Stationary cranes are installed in the various working areas to simplify the handling of individual loads such as positioning of items during the different repair and construction operations. Equipment handling facilities in general are designed with job simplifications as the main objective.

The facilities supplied each craft in their respective working areas are selected and installed to insure the best possible working conditions. The main locker and washroom is centrally located in the building. Air-conditioning equipment, utilities, some locker and storage space are located in a middle section of the building. Also in this middle section is located office space for the individual crafts. On either side of the offices is the shop's working area of two sections, divided by partition walls into the separate sections for the different crafts.

The new shop building at Baytown reflects study planning and know how. When completed for 100 per cent occupancy the layout will represent one of the outstanding refinery shops of the country.



Subject: What is the distinction between polyforming and hydroforming operations?

Discussion: (By Edwin F. Nelson, vice president, Universal Oil Products Co., from paper given at recent annual W.P.R.A. meeting, San Antonio).

IT has been pointed out that the loss in thermal reforming is predominantly to gas. This gas has a substantial olefin content, and polymerization is a natural supplement to thermal reforming. The most common form of this combination is the use of the polymerization process to convert C_3 and C_4 olefins to polymer gasoline. The addition of this polymer to the thermal reformate raises both yield and octane number, and therefore makes a substantial improvement in the yield-octane curve. Even this improved curve, however, eventually flattens out at too low an octane number. One contributing factor here is that at increasing thermal conversions the C_3 and C_4 olefins constitute a decreasing percentage of the total gas made. The addition of catalytic polymerization improves the selectivity of thermal reforming, but is unable to correct the production of large quantities of saturated gases.

Polyforming is an operation which combines thermal reforming with polymerization. By recycle of C_3 and C_4 gases to the reforming zone, their olefinic constituents are to some extent forced into liquid-forming reactions. While the chemistry is not identical in detail with that of the thermal reforming-catalytic polymerization combination, the same general considerations are applicable.

Hydroforming is a completely different approach to the problem of straight-run-gasoline octane improvement. It differs from the operator's viewpoint in being a catalytic process, in recycling large amounts of hydrogen, and in requiring frequent regeneration of the catalyst by burning off carbon. From the chemist's standpoint the differences are just as great.

While the typical reaction in thermal reforming is cracking of heavy paraffins to lighter paraffins and olefins, in hydroforming it is dehydrogenation of naphthenes to aromatics. In hydroforming, as in thermal reforming, the principal byproduct is light gas. In this case, however, the gas is saturated, and cannot be converted to polymer. The yield-octane curve for hydroforming is similar to that for thermal reforming plus polymerization. The necessity for regeneration leads to high plant and operating cost. Hydroforming, although originally designed for octane improvement, has been of most value as a wartime process for production of toluene.

Southern Minerals Resumes Purchase of Republic's Oil

CORPUS CHRISTI.—Southern Minerals Corp. has resumed the purchase of the 1,500 bbl. of crude produced daily in Southwest Texas by Republic Natural Gas Co. This crude had been bought by Tide Water Pipe Line Co. for the past year for a premium of 35 cents a barrel. Production is from East White Point, East Taft, and East Saxet fields.

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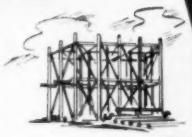

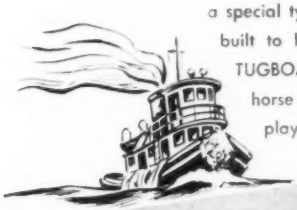

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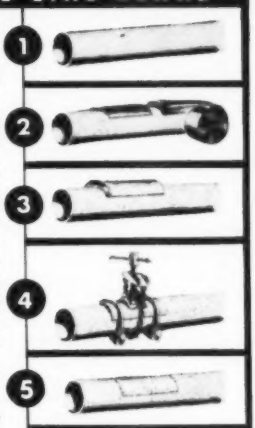

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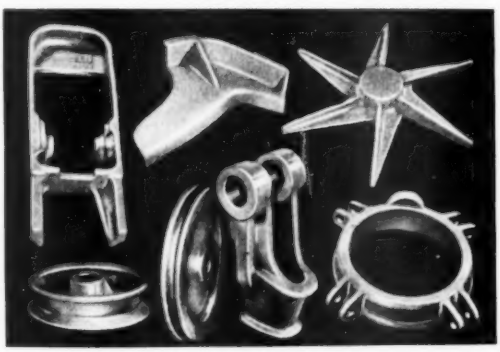

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Evaluation of Permeability From Electric-Log Resistivity Gradients

by M. P. Tixier

IT is observed that when a bore hole has traversed a reservoir rock, water saturated at the bottom and oil bearing at the top, the resistivity shows a corresponding increase from bottom to top. In the case of a formation of low permeability, such as a consolidated sandstone, it can be further observed that the resistivity curve, in the transition zone from the water table up to the zone of maximum oil saturation, is practically a straight line. In other words, the resistivity in the transition zone is a linear function of depth.

This particular feature can be utilized in connection with the data already available concerning the relationships between (a) resistivity and water saturation, (b) water saturation and capillary pressure, and (c) capillary pressure and permeability, in order to elaborate a method by which it becomes possible in many cases, to ascertain with fair approximation the permeability of a given formation from the electrical log.

The author, Rocky Mountain area manager for Schlumberger Well Surveying Corp., Denver, explains the existence of a constant resistivity gradient above and close to the water table in consolidated reservoir rocks of low permeability. A method for determining the permeability from the resistivity gradient is discussed. This method makes use of known relationships, expressed by empirical formulas, between resistivity and water saturation, water saturation and capillary pressure, capillary pressure and permeability.

Computations including these formulas result in an equation relating the permeability to the resistivity gradient, and depending on the values of the densities of the oil and the formation water.

Before proceeding with the discussion, we wish to point out the following general feature: all the observations outlined below are supposed to be related to fluids in static equilibrium inside the reservoir rocks. In other words, for all laboratory experiments referred to in the following development, steps have been taken so that the fluids studied be under physical conditions as close as possible to those prevailing inside the formations before any appreciable artificial drainage has occurred.

Gradient of Resistivity

Fig. 1 is an example of a log recorded opposite a sandstone where the water saturation increases progressively with depth; a transition zone can be seen on the resistivity log between points A and B, where

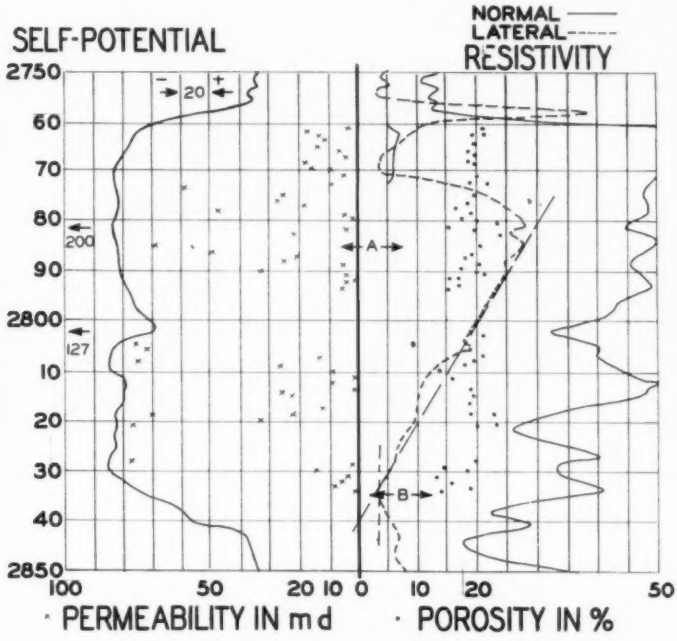

Fig. 1—Electric log of Layton (Oklahoma) sand

Here water saturation increases progressively with depth. At "A" (2,785 ft.), $R_t = R_o = 28$; at "B" (2,833 ft.), $R_t = 3.5$, $R_o = 3$; then $\Delta R/\Delta h = (28 - 3)/48 = 0.52$, and $a = 0.52 \times 0.172$. Average calculated permeability = 34 md., average laboratory permeability = 27 md. Mud resistivity = 1.5 ohms at bottom-hole temperature, hole diameter = 7 in., AM = 18 in., AO_2 = 14 in. Salinity = 200,000 p.p.m., oil gravity 40° A.P.I.

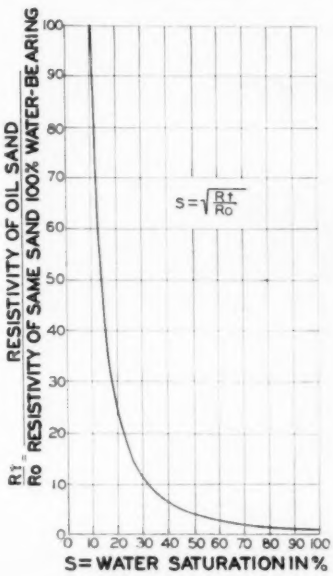
RESISTIVITY OF OIL SAND
RESISTIVITY OF SAME SAND 100% WATER-BEARING
Rt/Ro
S=√(Rt/Ro)
0 10 20 30 40 50 60 70 80 90 100
S= WATER SATURATION IN %

Fig. 2—Resistivity ratio versus water saturation

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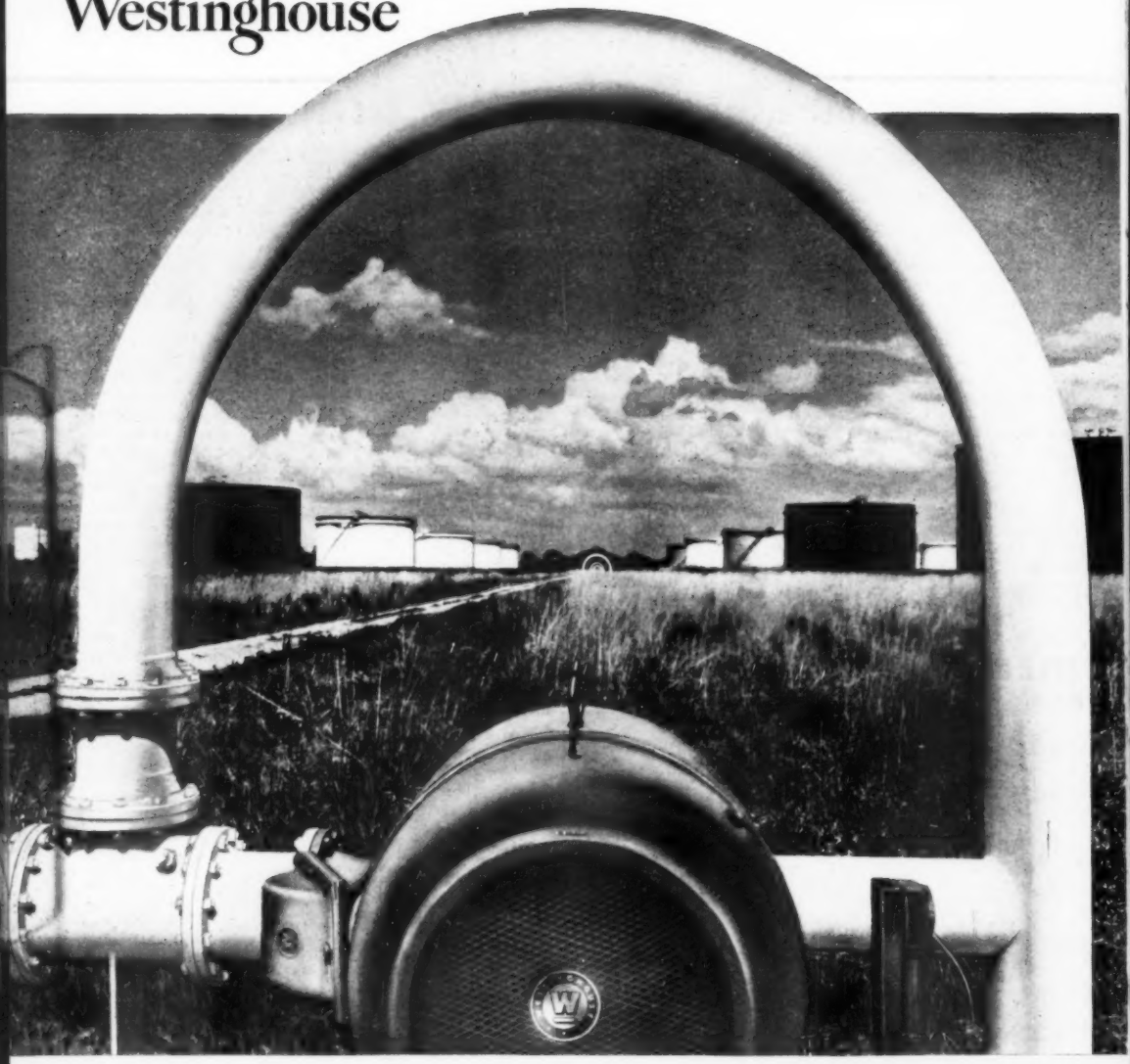

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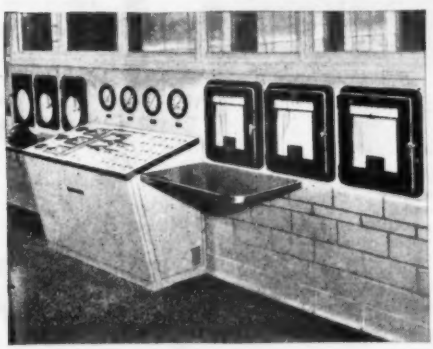
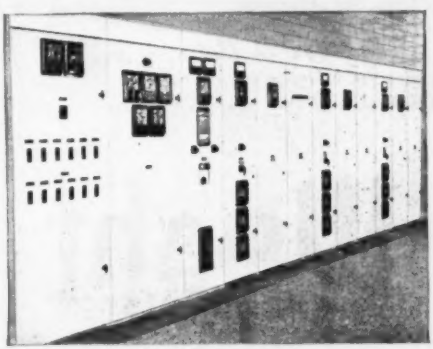


This control desk in a semiautomatic station has flow recorder and controllers for station suction and discharge pressures at left, pushbutton co-ordinated electrical control for pump units and motorized valves in center with pressure gages on panel above, and protective thermocouple recorders at right.



"Unitized" Metal-Clad Switchgear in a semiautomatic pump station, showing (left to right) low-voltage distribution, sequence control for automatic operation of pump units and valves, control of the outdoor main breaker, and reduced-voltage starting equipment for three main-line pump units.

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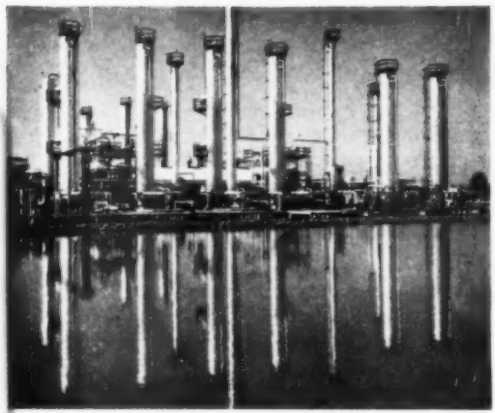

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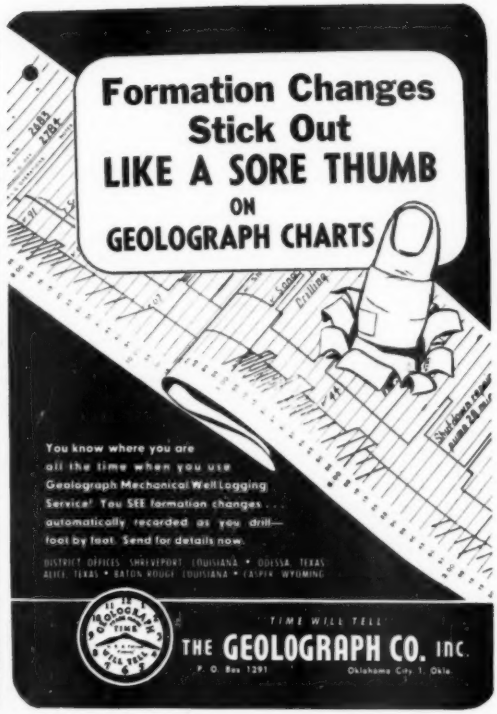

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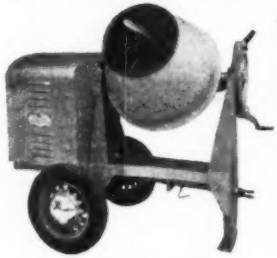

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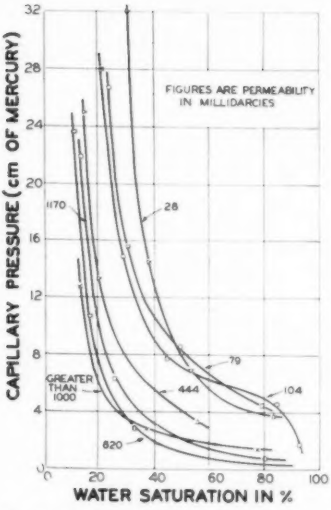


Fig. 3—Capillary pressure versus water saturation

the curve is close to a straight line. Since, in the transition zone, the resistivity can be regarded as a linear function of depth, a resistivity gradient may be defined as follows:

Let us call:

h the height in feet above the water table, R_{t1} the true resistivity of the formation at the level h_1, and R_{t2} the true resistivity of the formation at level h_2.

The resistivity gradient $\Delta R/\Delta h$ is equal to $\frac{R_{t1} - R_{t2}}{h_1 - h_2}$ and we may write:

$$R_t = \Delta R/\Delta h \times h + R_o \qquad (1)$$

with R_o being the true resistivity of the water-bearing zone.

In the case exhibited in Fig. 1, we have:

$$R_{t1} = 28$$

$$h_1 - h_2 = 48$$

$$R_{t2} = R_o = 3$$

$$\Delta R/\Delta h = 25/48 = 0.52$$

Resistivity versus water saturation. This relationship has been studied in detail (see Fig. 2), and can be expressed by the following formula:

$$S = (R_o/R_t)^{1/2} \qquad (2)$$

Let us recall that this formula is valid for S appreciably greater than the irreducible water saturation, or, in other words, its application is limited to sections not too high above the water table.

Introducing the resistivity gradient into Formula 2, we get:

$$S = 1/(1 + ah)^{1/2}$$

where $a = \Delta R/\Delta h \times 1/R_o \qquad (3)$

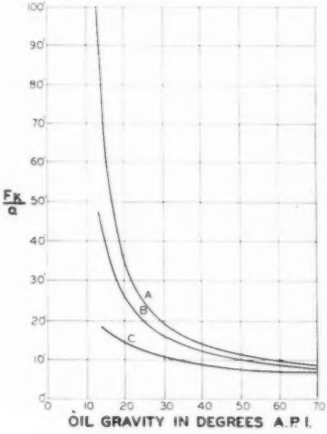


Fig. 6

Number of feet corresponding to 1 psi. of capillary pressure. A, for water of specific gravity = 1.0 (no salt); B, for water of specific gravity = 1.025 (sea water 37,500 p.p.m.); C, for water of specific gravity = 1.1 (150,000 p.p.m.). For gas under average conditions (2,000 psi., 110° F., specific gravity to air = 0.6), F_K a = 2.55.

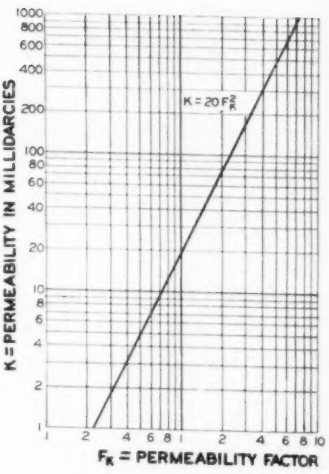


Fig. 7

Graph of the equation $F_K = \sqrt{K/C}$, where C = 20.

This factor "a," which is the resistivity gradient when R_o is equal to unity, will be called the "basic resistivity gradient."

Relation 3 expresses the water saturation in terms of the height above the water table. In view of the limitation of the scope of Formula 2, this relation holds only within a reasonable interval above the water level.

Water saturation versus capillary pressure. — Many laboratory experiments[2,3] and field applications have been made in that respect, and it has been found that in a consolidated sandstone, containing water and oil, the water saturation is closely connected to the value of the capillary pressure existing at the interface of the liquid phases. It has been further established that this relationship is affected by permeability. Fig. 3 shows the corresponding curves, water sat-

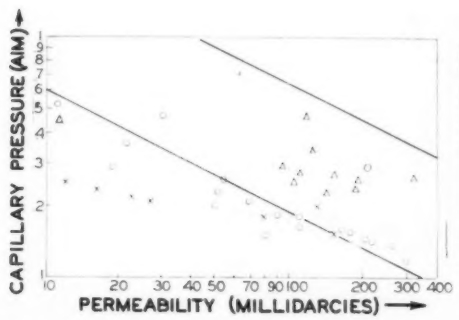


Fig. 4—Capillary pressure (at 70 per cent water saturation) versus permeability. Circles represent data for well consolidated sandstones, triangles for loosely consolidated California sandstones, crosses for dolomitic limestone. (Data by G. L. Hassler and E. Brunner)

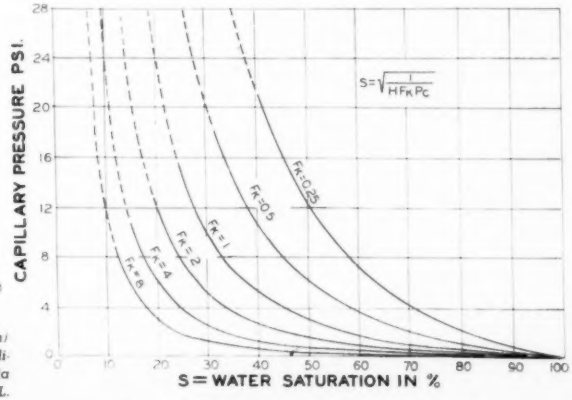


Fig. 5—Capillary pressure versus water saturation

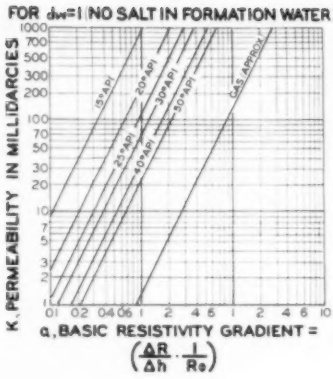


Fig. 8

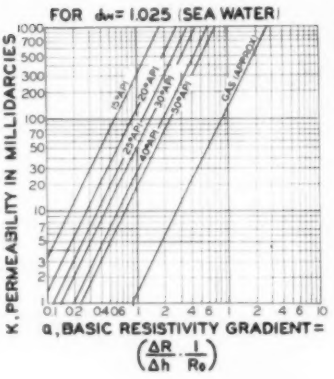


Fig. 9

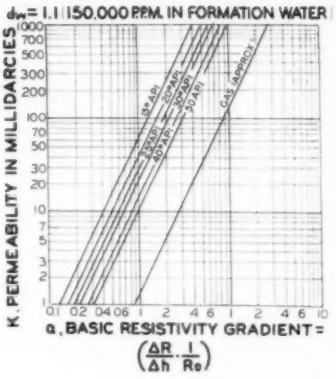


Fig. 10

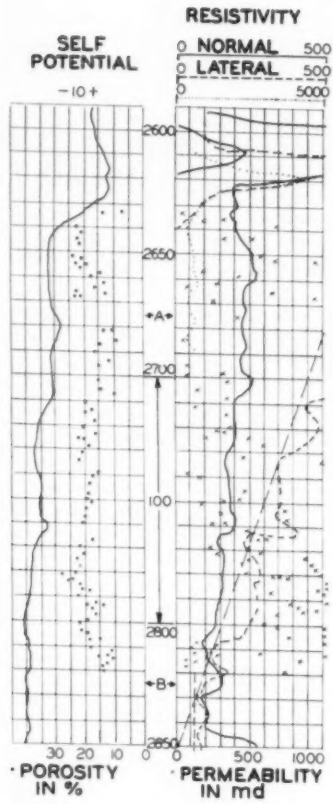


Fig. 11—Electric log, Wyoming Tensleep sand

At "A" (2,678 ft.) R_t = 500, R_i = 360; at "B" (2,828 ft.), R_t = 65, R_i = 60; then $\Delta R/\Delta h$ = (360 − 60) 150 = 2, and a = 2 60 = 0.033. Average calculated permeability = 425 md., average laboratory permeability = 450 md. Mud resistivity = 4.0 ohms at bottom-hole temperature, hole diameter = 9 in., AM = 18 in., AO = 16 ft. Water salinity = 3,000 p.p.m., oil gravity 12° A.P.I.

uration versus capillary pressure, each curve corresponding to a given value of the permeability.

On the other hand, the height to which water has to rise above the zero capillary level into a permeable formation in order to offset a given capillary pressure is given by the following formula:

$$h = 2.3 \frac{P_c}{d_w - d_o} \qquad (4)$$

where

h is in feet

P_c = capillary pressure, psi.

d_w = specific gravity of water

d_o = specific gravity of oil

In a water saturation versus capillary pressure graph, this relation can permit the replacing of the capillary pressure by the height above the water level. As a result, a profile of saturation can be determined in a given structure.

Permeability versus capillary pressure.—As already stated, the curves showing the relation between capillary pressure and saturation are dependent on the value of permeability: that is to say, that for a given formation, and a given water saturation, capillary pressure may be considered as a function of permeability: the measurements carried out in particular by Hassler and Brunner[4] upon consolidated Mid-Continent sandstones, containing 70 per cent water saturation, have shown that a fairly regular relationship seems to exist between both parameters, as exhibited in Fig. 4.

The general trend of the curve may be expressed by an empirical formula involving the square root of the permeability, such as:

$$P_c = f \times 1/K^{1/2} \qquad (5)$$

f being, of course, a function of water saturation, and also of the lithological nature of the formation (in particular, porosity). (Hassler has pointed out that this relation can be

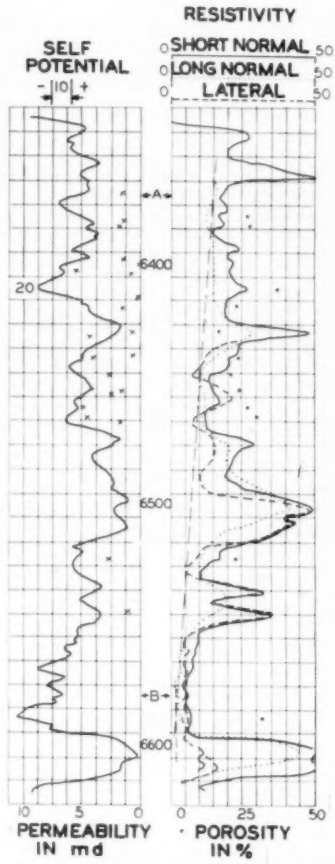


Fig. 12—Electric log, Weber sand, Rangely field, Colorado

At "A" (6,365 ft.), R_t = R_i = 15; at "B" (6,581 ft.), R_t = R_i = 2; then $\Delta R/\Delta h$ = (15 − 2) 216 = 0.06, and a = 0.06/2 = 0.03. Average calculated permeability = 2.2 md., average laboratory permeability = 2.72 md. Mud resistivity = 1.0 ohm at bottom-hole temperature, hole diameter = 9 in., AM = 16 in., AM' = 64 in., AO = 24 ft. Water salinity = 100,000 p.p.m., oil gravity 35° A.P.I.

MARLEY ANNOUNCES NEW *DriCooler**

Cooling Tower Manufacturer Supplements Line With Finned-Tube Dry Surface Cooling Equipment

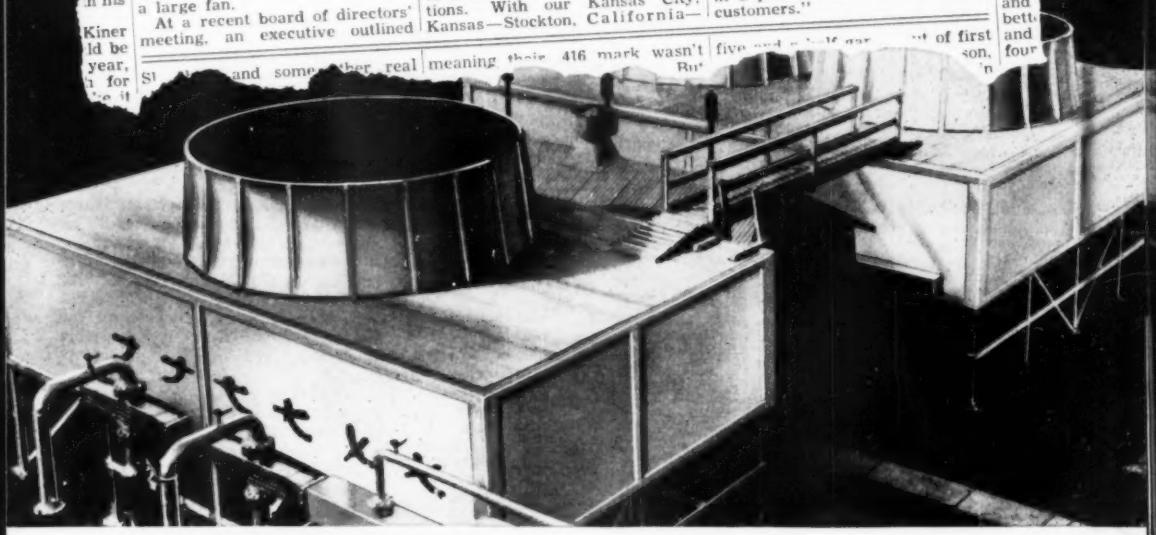
Kansas City, Kans., April 3.—The Marley Company, Inc., manufacturers of water cooling products, have announced that they are introducing a new product, the DriCooler.

Company officials said that The Marley Company has been manufacturing similar finned-tube dry surface cooling equipment for another company for some time. This equipment cools fluids by circulating them through finned tubes while air is forced or induced across their surface with a large fan.

At a recent board of directors' meeting, an executive outlined the company's position. "Our fans, drive shafts, Geareducers, and fan cylinders, which have proved so successful on our water cooling towers, are used on the DriCooler. Framing, either wood or metal, is also similar to that used in cooling tower design. We have developed something new, a sheet asbestos covered redwood frame that requires little maintenance, even in very corrosive atmospheres.

"For the present we will alter our three basic DriCooler designs to meet the customers' specifications. With our Kansas City, Kansas—Stockton, California—Louisville, Kentucky, plants now in operation, we have the flexibility to turn out special as well as standard designs. All parts of the DriCooler are designed and manufactured by us except the heat transfer surface which is made to Marley's specification.

"Although water cooling towers and DriCoolers have individual applications, the fields often overlap and a thorough evaluation must be made of both types of equipment to determine which is more economical. Since we make both kinds of equipment, we are in a position to better serve our customers."



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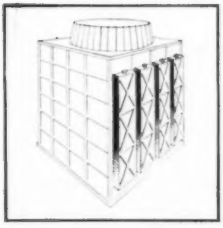
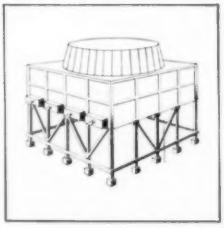
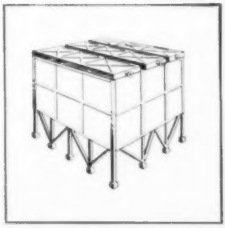


1. Induced Draft vertical or horizontal heat transfer surface on two sides.



2. Induced Draft horizontal heat transfer surface under the fan.



3. Forced Draft horizontal heat transfer surface over the fan.

*DriCooler is the exclusive trademark of The Marley Co., Inc., and is used to designate its finned tube dry cooling equipment.

MARLEY COOLING TOWERS

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theoretically expected for dimensional reasons.)

Permeability versus resistivity gradient.—These different data having been recalled, we may now go back to Formula 3 involving saturation and resistivity gradient.

Formula 3 may be written:

$$S = 1/(1 + ah)^{1/2}$$

$$= 1/[1 + (\Delta R/\Delta h)\,(1/R_o)\,h]^{1/2}$$

Substituting the value of h in terms of P_c (Formula 4) into this equation, we obtain:

$$S = 1/(1 + F_K\,P_c)^{1/2} \qquad (6)$$

where

$$F_K = \frac{\Delta R}{\Delta h}\,\frac{1}{R_o}\,\frac{2.3}{d_e - d_o}$$

$$= a\,\frac{2.3}{d_e - d_o} \qquad (7)$$

Then F_K is a factor proportional to the basic resistivity gradient a, and depending on the density d_o of the oil in the reservoir, and on the density d_e of the formation water.

Fig. 5 illustrates Relation 6, each curve corresponding to different values of F_K.

Fig. 6 gives F_K/a in terms of d_e: the ordinates of this figure represent the number of feet in the structure equivalent to 1 psi. of capillary pressure.

On the other hand, referring to Equation 6, for a given value of the water saturation S, the product $F_K P_c$ is constant, and, Formula 5 being taken into account, it appears that F_K is proportional to the square root of the permeability K.

The relationship between F_K and K may be thus expressed by the empirical formula which should involve porosity and a lithological coefficient depending on the nature of the formation. Nevertheless, comparisons carried out in various Mid-Continent fields, between the values of F_K deduced from the logs and the available data concerning permeability, have shown so far that the relationship may be simply written, for that region:

$$F_K = (K/C)^{1/2} \qquad (8)$$

The average value of C is about 20, but may be higher in some cases. F_K is called the permeability factor. Equation 8 is graphically reproduced in Fig. 7 for C = 20.

Applications

The relationship between permeability and resistivity gradient may be deduced from Equations 7 and 8:

$$(K/C)^{1/2} = a\,\frac{2.3}{d_e - d_o}$$

or

$$K = C\left(a\,\frac{2.3}{d_e - d_o}\right)^2 \qquad (9)$$

This equation gives K versus a and includes two parameters d_e and d_o: it may be graphically represented by means of several sets of curves.

These curves are shown in three charts. (Figs. 8, 9, and 10), respectively corresponding to three values of d_e (1, 1.025, 1.1). Each chart contains a set of curves computed for the following values of d_o in degrees A.P.I.: 15, 20, 25, 30, 40, and 50. An additional curve is given for gas under average conditions.

The procedure for the determination of permeability is the following:

The basic resistivity factor a is deduced from the electric log; then a suitable chart is chosen according to the value known or reasonably assumed for the density of connate water (d_e), and a curve is selected in this chart corresponding to the value of the density of oil (d_o). A point corresponding to an abscissa equal to the value of a is marked on this curve and the ordinate of this point gives the value of the permeability.

On the other hand, Formula 9 may be written:

$$a = \left(\frac{K}{C}\right)^{1/2}\frac{d_e - d_o}{2.3}$$

The thickness of the transition zone being inversely proportional to the basic resistivity gradient, it results that the heavier the oil and the smaller the permeability, the greater is this thickness. Tables 1 and 2 give some average figures of the values of the heights above the water table of points where the water saturations are respectively 50 and 25 per cent for different values of permeability and oil gravity. It appears that this thickness becomes extremely small and practically unnoticeable on the log in the case of highly permeable sands saturated with light hydrocarbons.

Let us furthermore remark that if an approximate value of R_o may be reasonably assumed, the depth of the water table can be forecast from the resistivity logs before the hole has entered it.

Examples

Four examples have been selected

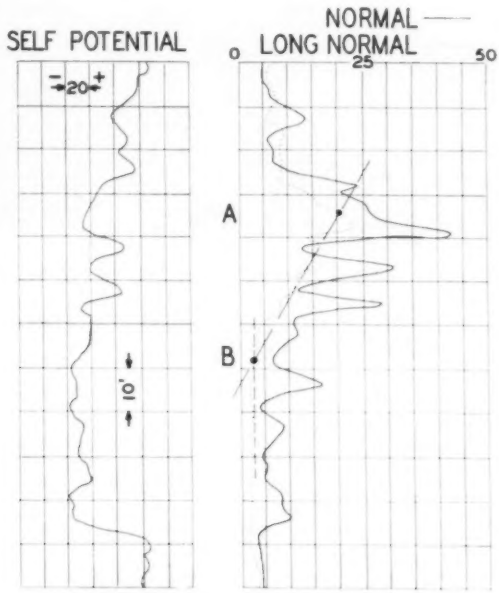

Fig. 13—Electric log, Cisco sand, North Texas

At "A," $R_{IX} = R_i = 20$; at "B," $R_{IX} = 2.5$, $R_i = 2$; then $\Delta R/\Delta l$ (20 — 2)/34 = 0.531, and a = 0.531/2 = 0.265. Average calculated permeability = 310 md., average laboratory permeability range = 200-700 md. Mud resistivity = 0.6 at bottom-hole temperature, hole diameter = 9 in., AM = 16 in., AM = 64 in. Salinity of water = sea-water, oil gravity 30° A.P.I.

TABLE 1—AVERAGE HEIGHT IN FEET ABOVE WATER TABLE TO OBTAIN A WATER SATURATION OF 50 PER CENT IN SANDSTONES

(for $K = 20\,F_K^2$, $d_e = 1$)

Gravity, A.P.I.	15	20	25	30	40	50	Gas
Permeability K, md.							
1,000	29	15	10	8	5	4	1
300	53	27	19	14	10	8	2
100	92	47	33	25	18	14	3
50	126	65	45	35	24	19	5
10	290	150	104	80	56	45	11
1	915	472	326	246	178	142	35

TABLE 2—AVERAGE HEIGHT IN FEET ABOVE WATER TABLE TO OBTAIN A WATER SATURATION OF 25 PER CENT IN SANDSTONES

(for $K = 20\,F_K^2$, $d_e = 1$)

Gravity, A.P.I.	15	20	25	30	40	50	Gas
Permeability K, md.							
1,000	145	75	51	40	28	22	5
300	267	137	95	73	52	41	10
100	460	232	164	127	89	71	17
50	630	325	225	174	123	98	24
10	1,450	750	525	400	280	225	55
1	4,575	2,360	1,630	1,280	890	710	175

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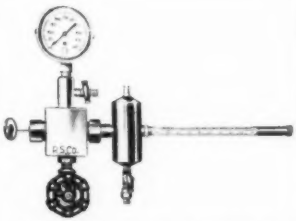

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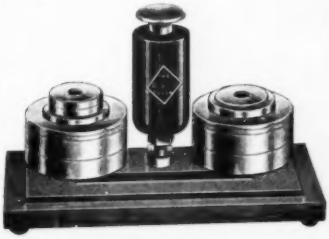

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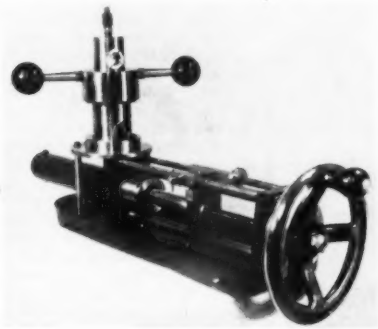

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to illustrate the procedures outlined, as related to formations of different permeabilities, and containing oil of different gravities. Without entering into details, we shall only say that the values of the resistivities used for the determination of the gradient have been obtained from the readings of the long normal or the lateral curves, depending on the case, those values being corrected by means of data furnished by the departure curves.

Example 1.—(See Fig. 1.) This shows the resistivity gradient opposite the Layton sandstone of Oklahoma. Low permeability (average calculated value: 34 md.; average laboratory determination: 27 md.) Light oil (gravity 40° A.P.I.).

Example 2.—(Fig. 11.) Illustration has been chosen from an electrical log in Wyoming: sand containing heavy oil (gravity 12° A.P.I.). The average calculated permeability is 425 md., whereas the average figure given by the laboratory measurements on samples is about 450 md.

Example 3.—(Fig. 12.) Rangely sandstone (Colorado). The resistivity curve in the transition zone shows a great number of peaks, so that the tracing of the resistivity gradient seems rather difficult. The formation is obviously nonhomogeneous, and the peaks correspond to harder zones inside the formation.

It must be pointed out that these zones, according to general geological features in this area, are of limited extension, so that there is no continuous impervious barrier within the reservoir. It is, therefore, possible to neglect the different peaks, and to draw an average straight line along the zones of comparatively low resistivity, which determines a resistivity gradient with a fair accuracy, as shown on the picture.

The calculated value of permeability is about 2.2 md.—the average value from laboratory measurements being 2.72 md. Light oil (gravity 35° A.P.I.).

Example 4.—(Fig. 13.) Cisco sand, North Texas: The sand is interbedded with thin, impervious, shaly streaks; nevertheless, the long normal curve shows a fairly straight line which enables the determination of an average resistivity gradient. Hence, the average calculated permeability is 420 md.—the figures gathered in the laboratory ranging between 200 and 700 md. Light oil (30° A.P.I.).

Acknowledgment

The author wishes to acknowledge the cooperation of Continental Oil Co., Phillips Petroleum Co., Shell Oil Co., Inc., and The Texas Co., which were kind enough to provide examples.

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2. "Capillary Behavior in Porous Solids," by M. C. Leverett (A.I.M.E.—T. P. 1223).
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4. "Measurement of Capillary Pressures in Small Core Samples," by G. L. Hassler and E. Brunner (A.I.M.E.—T. P. 1817).

5. "A Study of the Relationship Between Grain Size and Capillary Pressure Curves," by Michael Y. Popovitch; Producers' Monthly, October 1947.

Oil Recovery Prediction

(Continued from page 89)

are drawn from the following table:

Porosity 20 per cent: Viscosity 4 cp.: Connate water 25 per cent

F.V.F.	Per cent pore space	Bbl. ac.-ft.	S.-T. oil = 1,552—388 F.V.F.	Per cent original S.-T. oil
1.1	15.5	240	1,062	22.4
.2	13.3	206	980	21.0
.3	11.9	186	895	20.8
.4	11.0	172	835	20.6
.5	10.3	160	775	20.6
.6	9.7	150	730	20.6
.7	9.3	143	685	20.9
.8	9.0	138	648	21.3
.9	8.7	134	615	21.7
2.0	8.4	130	582	22.3
2.5	7.7	118	468	25.3

Increased recovery results from lower shrinkage. Going from 2.5 to 1.1 F.V.F. doubles the recovery in per cent of pore space and barrels per acre-foot. The curve for per cent of original stock-tank oil shows a reversal because of the different rate of change for barrels per acre-foot as compared with original stock-tank barrels. Going from 2.5 to 1.5 F.V.F., actual recovery increases 36 per cent while original stock-tank oil increases 66 per cent. Going from 1.5 to 1.1 F.V.F., actual recovery increases 50 per cent while original stock-tank oil increases 37 per cent.

Effect of Connate Water

The following from Muskat's and Taylor's Table 4 shows the effect of connate water on the same hypothetical reservoir, solubility 534 cu. ft. per barrel, shrinkage 44.5 per cent of stock-tank oil, atmospheric pressure viscosity 2.76 cp.

Connate water, per cent	Stock-tank recovery to 100 psi., per cent of pore space
30	16.70
0	15.46

Fig. 5 illustrates the effect of connate water as read from the primary nomograph (Fig. 2). The curves are drawn from the following table:

Per cent connate water	Per cent pore space	Bbl. ac.-ft.	S.-T. oil = 1,552—wtr. 1.40	Per cent S.-T. oil
0	9.8	152	1,100	13.7
10	10.3	160	1,000	16.0
20	10.8	168	885	19.0
30	11.3	176	775	22.7
40	11.8	183	665	27.5
50	12.3	191	557	34.5

Increased recovery results from increase in connate water. Going from 10 to 50 per cent connate water, re-

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covery increases by one-fifth. At the same time the original stock-tank oil decreases from 1,000 to 557 bbl.; hence with this change in connate-water content, recovery more than doubles in terms of per cent of stock-tank oil.

Effect of Variations in Permeability-Saturation Relationship

Muskat and Taylor[4] made calculations comparing three different permeability-saturation curves. In their study, the ultimate recovery, in terms of per cent of pore space, was found not very sensitive to the details of the permeability-saturation curve that was used. The three curves showed 16.70, 16.19, and 15.46 per cent of pore space, respectively. The permeability-saturation curves used were those corresponding to the data of Leverett and Lewis.[5]

Additional Nomograph Scales

A.P.I. gravity scale.—Beal[6] has drawn an average curve through 650 points to represent the relation between viscosity at 100° F. and A.P.I. gravity at 60° F. Deviation of points averaged 18 per cent and was as high as 35 per cent. Beal's curve was used as a basis for the gravity scale in the primary nomograph, (Fig. 2): for example, 30° gravity corresponds to 10 cp.; 46° gravity corresponds to 2 cp.

Solubility scale.—Katz[7] has presented the relationship between solubility and shrinkage, based on the study of 117 samples of reservoir oil. The average deviation was 15 per cent and was as high as 25 per cent. Katz's curve was used as a basis for the solubility scale in the primary nomograph (Fig. 2): for example, 400 cu. ft. per barrel corresponds to 1.20 F.V.F.; 1,200 cu. ft. per barrel corresponds to 1.60 F.V.F.

Depth scale.—Morris[8] has investigated the relationship between well depth and solubility shrinkage. Depth of producing formation does not enter the solubility relationship directly. Depth vs. shrinkage points are widely scattered; deviation averages 50 per cent and is as high as 100 per cent.

This emphasizes the importance of obtaining an early measurement or estimate of producing gas-oil ratio as an indication of initial solubility.

On the depth scale, 3,000 ft. corresponds to 1.20 F.V.F.; 9,000 ft. corresponds to 1.60 F.V.F.

Permeability scale.—Moyer[9] reached tentative conclusions as to the effect of permeability and thickness on economic ultimate oil recovery. His assumptions are: drainage radius 640 ft.; economic limit 5 bbl. per day; final well-bore pressure 0 psi. The following is from Table 3:

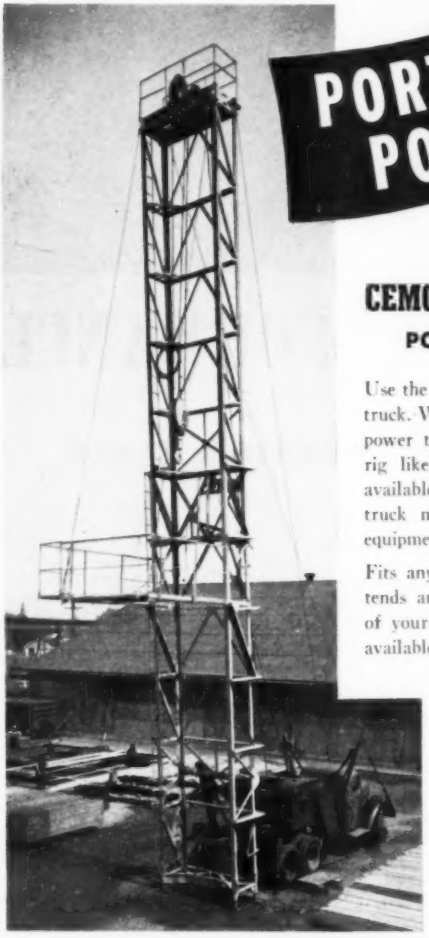
Permeability (md.)	Thickness (ft.)	Stock tank (bbl. per foot of sand)
10	10	7,278
	100	8,877
57	10	10,408
	100	10,589
500	10	10,588
	100	10,622

Keller, Tracy, and Roe[10] analyzed the effect of permeability and thickness on recovery efficiency. They assume drainage radius 745 ft.; economic limit 3 bbl. per day; final well-bore pressure 0 psi. The following is from Table 2.

Permeability (md.)	Thickness (ft.)	Recovery efficiency per cent original oil in place
1	10	7.58
	50	15.38
	90	16.67
10	10	16.89
	50	19.10
	90	19.65
100	10	19.75
	50	20.50
	90	20.56

In the primary nomograph (Fig. 2) the example is extended through the permeability scale. Recovery 235 bbl. per acre-foot is reduced to 190 bbl. per acre-foot for 10 md. permeability and 10-ft. thickness.

Gas-cap scale.—If it is found desirable to extend the nomograph beyond strictly solution gas-drive reservoirs, a scale may be introduced for rela-



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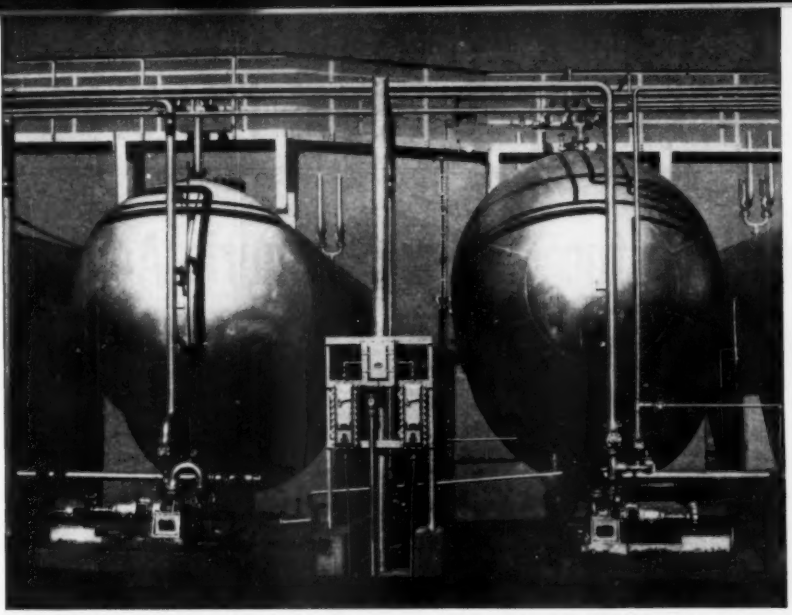


Two 2½ HR I Worthington Centrifugal Pumps in LPG loading service at Skelly Oil Co., Velma, Okla.

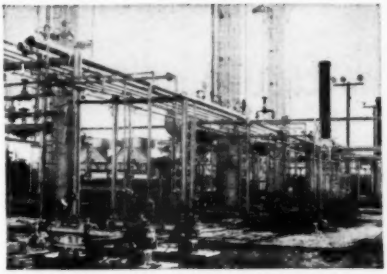
New Arrivals at Skelly Doing Fine

During 1947 and 1948, the Skelly Oil Co., nationally known producers and refiners of oil, installed 8 Worthington Hi-Vols and two Worthington centrifugal pumps in their Velma, Oklahoma plant.

The 8 Hi-Vols (6 x 5 x 12 AO and 8 x 5 x 12 AO) handle Ethane and Hydrocarbons on transfer and still charging in a gasoline plant. Discharge pressures and suction pressures of each pump are 475—525 psi and 100—260 psi, respectively.

The centrifugal pumps are used on LPG gasoline loading service, pumping light Hydrocarbon and Diethyline Glycol with discharge ratings of 525 and 575 psi respectively.

All pumps are in excellent operating condition according to plant officials.



Worthington Hi-Vol Pumps at Skelly Oil Co., Velma, Okla.

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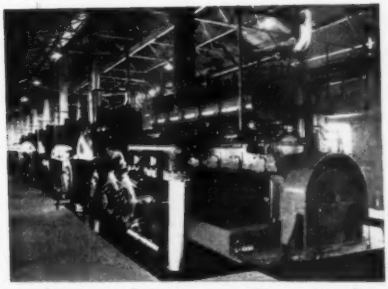


Worthington Angle Compressors at Warren Petroleum Company's plant in Holliday, Texas.

The Warren Petroleum Co., the world's largest marketers and manufacturers of natural gasoline and LPG, have recently added two new Worthington LTC 800 hp Compressors to their compressor line-up at the Gasoline and Pressure Maintenance Plant in Holliday, Texas.

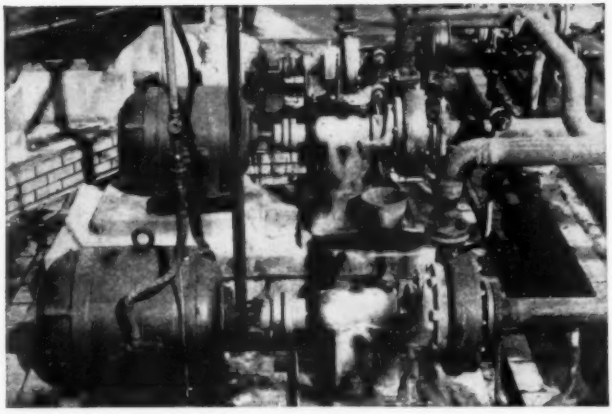
The photograph shows a view of eight Worthington LTC Angle Compressors representing a total of 5,200 hp, for handling wet gas and repressuring. All gas is processed before final discharge pressure of 800 pounds per square inch.

Installation of Worthington machinery began in 1946. Performance has been so excellent, that when officials decided to increase capacity, it was Worthington again that got the order!

9-7

NEWS from the petroleum front

Nothing too Fat For Sulphuric Acid



Worthite pumps and valves handling 90% sulphuric acid at Esso Standard Oil Co., Baton Rouge, La.

Esso Standard Oil Company at Baton Rouge, La. installed two 2-CG-3 Worthite Centrifugal Pumps to deliver 90% spent sulphuric acid via pipe line to adjacent Consolidated Chemical Industries plant, where acid is fortified and pumped back to the oil refinery for re-use. Worthite is a machinable, high strength alloy steel containing about 52% alloying elements (nickel, chromium, molybdenum, silicon, copper, manganese).

The pump in the foreground of the photo is equipped with a mechanical seal developed by Worthington. This seal has the unique advantage of resisting corrosion and preventing leakage at the stuffing box, thus eliminating the necessity of valve manipulation to control drip. The seal is effective whether the pump is operating or not.

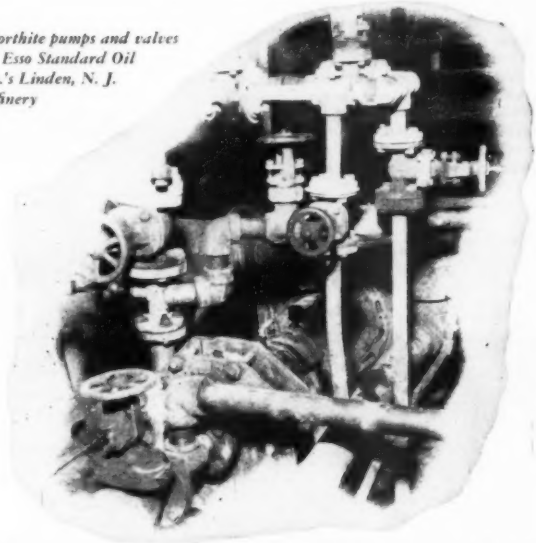
How Esso Handles Fuming H_2SO_4 (Oleum)

The advantages of Worthite for handling .98 to 105% H_2SO_4 has been demonstrated by nine years experience with Worthite pumps and valves at Esso Standard Oil Company's plant in Linden, New Jersey.

The leakage of Oleum from a pump stuffing box could create a very serious problem. Where pressure exists on the pump inlet this problem is much more serious. Conventional use of a water seal is impractical due to the chemical reaction. This problem was solved by throttling a valve in the suction line to create a pressure below atmospheric at the pump suction. The packing in the pump stuffing box now has a much easier function, that of preventing inleakage of air, and gives satisfactory service.

The valves used previously on this service were plug cocks which tended to stick or freeze up, often requiring the use of a six foot bar wrench to turn. This difficulty was overcome by using Worthite gate valves, as shown in the illustration. The Worthite gate valves turn freely and have given many years of trouble-free service.

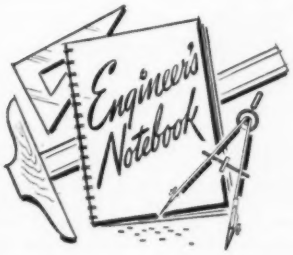
Worthite pumps and valves in Esso Standard Oil Co.'s Linden, N. J. refinery



The development of the mechanical seal for Worthite Chemical Pumps has further simplified the solution of the stuffing box problem when pumping Oleum. The seal automatically stops stuffing box leakage without adjustment or throttling on the pump suction. An installation in a chemical plant using the seal has given nearly a year of service without leakage or adjustment.

Worthington Pump and Machinery Corporation
Harrison, N. J.

NEWS

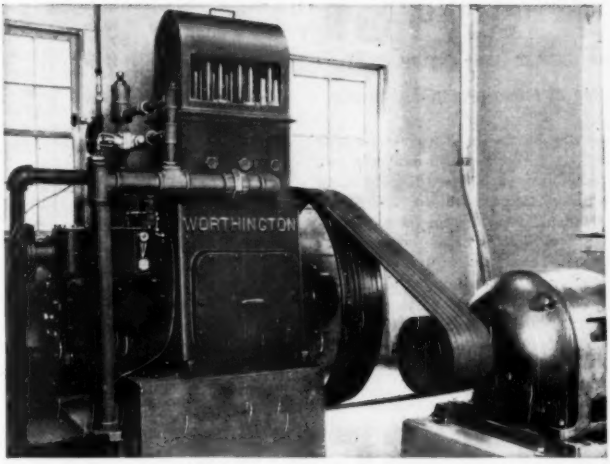


Worthington Pumps for Product Pipelines

The application of pumping equipment to product pipelines requires that special consideration be given to the means used for varying capacity to obtain the maximum through-put at all times.

With the wide variety of products handled in a product line, a maximum through-put can be obtained only when pumping the lightest product, if the operating pressure remains constant. When heavier products having higher viscosities are pumped, the pipe friction due to the greater viscosity increases, and the volume pumped must be reduced if the line operating pressure is to be maintained at the design value. The advantages which are obtained by automatically varying the pump capacity to maintain the desired line pressure are obvious. Stepless capacity control obtained automatically will result in the greatest possible through-put, regardless of the products or combination of products being handled.

The Worthington Automatic Variflo power pump is ideally adapted to this type of operation. Capacity variation is obtained by a very simple mechanism built into the pump crankshaft, and functions on the principle of changing the eccentricity of the cranks at each plunger location. Use of a standard pneumatic type pressure governor provides automatic capacity control from 0 to 100% by adjusting the pump stroke to maintain the discharge pressure constant.



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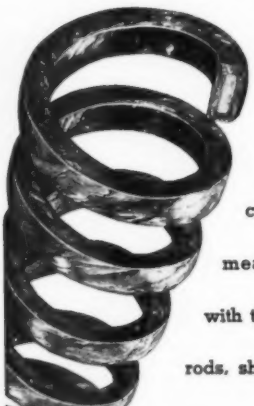

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tive size of gas cap. Tarner's Table 1[2] shows that if the ratio of the initial gas cap volume to initial reservoir oil volume is increased from 0 to 1, the recovery will increase from 37.5 to 45.5 per cent of the original oil in place.

Statistical Support

Nomograph predictions were compared with calculations of primary recovery for 24 solution-gas-drive reservoirs. Various methods of calculating recoveries were used, including: the application of assumed recovery factors to pore volume calculations of original oil in place; relative permeability calculations after Babson,[1] Tarner,[2] and Muskat.[4] The following are two examples:

Example 1.—Calculated recovery for a sandstone reservoir with porosity 17 per cent was 193 bbl. per acre-foot. Nomograph prediction is 165, based on viscosity 5.6 cp., F.V.F. 1.14, connate water 35 per cent. Nomograph prediction is 195, based on gravity 40°, depth 3,000 ft., estimated connate water 25 per cent.

Example 2.—Calculated recovery for a limestone reservoir with porosity 10 per cent was 91 bbl. per acre-foot. Nomograph prediction is 95, based on viscosity 1.67 cp., F.V.F. 1.71, connate water 20 per cent. Nomograph prediction is 105 based on gravity 47°, depth 8,100 ft., estimated connate water 25 per cent.

Calculated recovery from the 24 reservoirs averages 145 bbl. per acre-foot. Nomograph prediction (viscosity: shrinkage: connate water) averages 136; average deviation is 25 per cent.

Three other supporting statistical groups are used: pool statistics, mostly from A.I.M.E.; Bureau of Mines' reports; Craze and Buckley's A.P.I. paper.

In compiling published pool statistics, reservoirs are selected whose present yearly rate indicates they have produced a high proportion, probably over 95 per cent, of their primary ultimate; and for which thickness and porosity of producing formation are available. It is necessary to restrict the comparison list to solution-gas-drive reservoirs. The original 81 were reduced to 52 by separating three groups. Six reservoirs of South Central Texas produce from Serpentine, and the nomograph prediction shows very erratic comparison with cumulative production. Seven Woodbine water-drive reservoirs of East Central Texas have recovered four times as much oil as the nomograph predictions for solution-gas drive. Sixteen reservoirs report recoveries greater than 300 bbl. per acre-foot, when reduced to a 20 per cent porosity basis, and are suspected of being subject to more than solution gas drive alone.

Nomograph prediction is more than double the recorded cumulative production in the case of five reservoirs.

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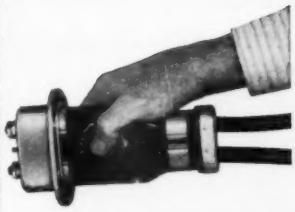

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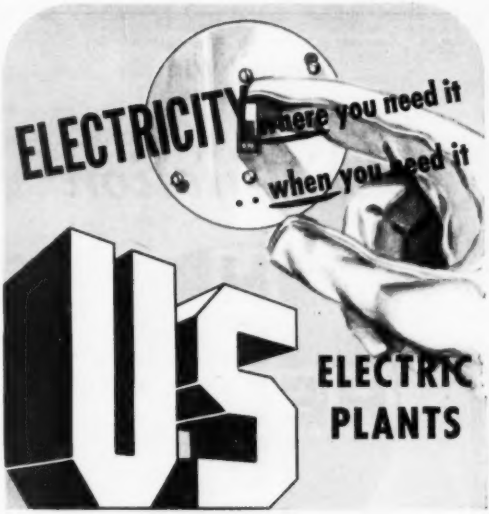

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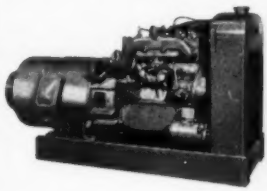

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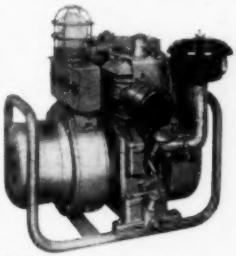

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The most probable reason for the wide disagreement is low permeability. It is to be emphasized that we are here considering only primary life, which ends at the economic limit. Low permeability affects both the recorded cumulative production and the nomograph prediction. Because of slower rate of production, the recorded cumulative production falls farther behind the ultimate primary; when the low permeability correction is not applied in the nomograph the prediction remains too high. For example, in one case where the recorded cumulative production is 63 bbl. per acre-foot, the nomograph prediction of 205 would be reduced to close agreement by applying permeability correction for 1 md. and 10 ft. thickness.

The U. S. Bureau of Mines has collected data on secondary-recovery projects. Its published reports sometimes include records of primary production.[15,16,17,18,19]

Craze and Buckley[20] tabulated data from 103 pools. Recoveries per acre-foot were studied by them to determine the relation between recoveries and well spacing. The 103 include 27 pools classified as "gas drive." The 27 pools include 13 whose published recoveries are greater than 300 bbl. per acre-foot, when corrected to a 20 per cent porosity basis; these were discarded as suspected of being subject to recovery influences additional to solution gas drive.

The four groups of supporting statistical data are shown in the accompanying tabulation to compare the nomograph agreement for each group.

	Special studies	Published pool data	Bureau of Mines reports	Craze and Buckley
Number of reservoirs	24	52	16	14
	Barrels per acre-foot			
Calculated	145	185	255	215
Nomograph (viscosity, shrinkage, connate water)	136 avg. deviation 25 per cent			218 avg. deviation 38 per cent
Nomograph (gravity, depth, assumed connate water)	133 avg. devia. 26 per cent	210 avg. devia. 36 per cent	283 avg. devia. 36 per cent	

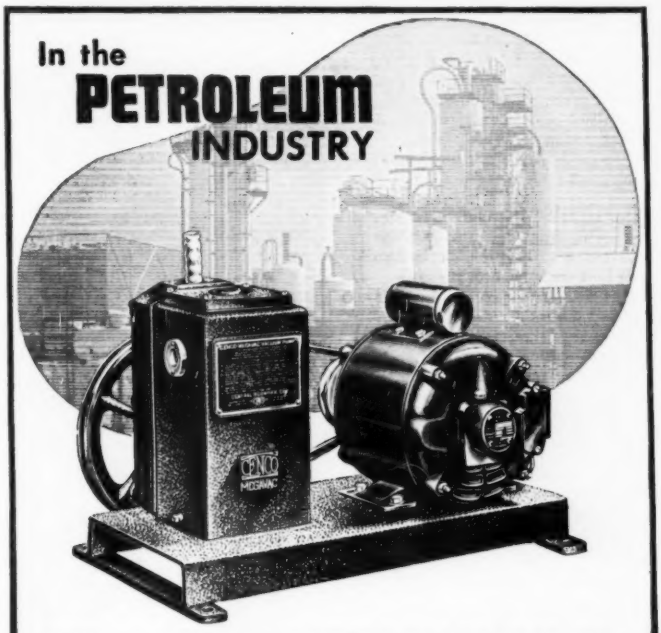
Nomograph for Total (Primary + Secondary) Recovery

Fig. 6 is a nomograph for predicting the combined total of primary recovery and oil "available" for secondary recovery. The example shown is the same reservoir as for the example in the primary nomograph. Going from connate water 25 per cent through F.V.F. 1.40 and viscosity 3.1 cp. results in 32.2 per cent of the pore space. Continuing through 25 per cent porosity the recovery is 620 bbl. per acre-foot.

Natural Water Drive

The 620 bbl. from the secondary nomograph represents the oil recoverable by an effective natural water drive, where the reservoir pressure is maintained near the original pressure. The primary nomograph predicted 235 bbl. per acre-fot primary recovery from this reservoir. The 620 is 235 multiplied by 2.6. Is there reason to assume that a ratio of the order of 2.6 corresponds to field experience?

Data are available for three effective water-drive reservoirs which are near the end of their productive life. The average actual ultimate recovery for these three fields is 442 bbl. per acre-foot. The prediction from the secondary nomograph averages 433. The prediction from the primary nomograph is 178. The ratio between the secondary and the primary figure is 2.4. It is interesting to refer back to the ratio stated by Horner.[21] He compared 4,000-bbl.-per-acre recovery



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by gas expansion with 10,400 bbl. per acre recovery "if water injection and water encroachment were controlled so as to maintain sufficient pressure to keep most of the gas in solution in the oil." Horner's solution gas-water drive ratio is 2.6.

The secondary nomograph is not in close agreement with the actual recoveries of the Woodbine water-drive group. The average "actual" is 1,050 bbl. per acre-foot; the average prediction from the secondary nomograph is 804 bbl. per acre-foot.

The 72 "water drive" reservoirs in Craze and Buckley's table average 596 bbl. per acre-foot ultimate recovery. The prediction from the secondary nomograph averages 735 bbl. per acre-foot. It may be assumed that these 72 reservoirs classified as water drive include many where the water drive is not fully effective in maintaining pressure.

Secondary Recovery

The **"A"** or primary oil is predicted by the primary nomograph (Fig. 2). **"A"** plus **"B"** is predicted by the secondary nomograph (Fig. 6). **"B"** is obtained by subtraction. **"B"** is the oil available for secondary recovery; the oil remaining in the reservoir after primary solution gas depletion, less the oil not recoverable by any primary or secondary means.

The effect of the various characteristics on the recovery of **"A,"** the primary production, has been previously discussed; their effect on the **"B"** oil is now shown. Refer again to Figs. 3, 4, and 5. Values for **"C,"** oil not recoverable, are those shown in Fig. 1: 310 and 388.

The following tabulation shows a decrease of 474 bbl. per acre-foot in **"B"** corresponding to increase in connate water from 10 to 50 per cent (Fig. 5):

	Per cent of pore volume	
Connate water	10	50
	Barrels per cu. ft.	
A	160	191
C	310	310
B	530	56
A + B + C	1,000	557

The following tabulation shows an increase of 472 bbl. in **"B"** corresponding to decrease in formation volume factor from 2.5 to 1.1 (Fig. 4):

Formation volume factor	2.5	1.1
	Barrels per ac.-ft.	
A	118	240
C	310	310
B	40	512
A + B + C	468	1,062

The following tabulation shows a small decrease, 24 bbl. per acre-foot, in **"B,"** corresponding to decrease in viscosity from 10 to 2 cp. (Fig. 3):

	Centipoises	
Viscosity	10	2
	Barrels per ac.-ft.	
A	118	220
C	388	310
B	325	301
A + B + C	831	831

Low permeability indirectly increases the amount of oil available for secondary recovery, by reducing the amount of primary recovery. Low permeability also acts in the other direction to reduce the actual amount produced by a secondary recovery project before reaching its economic limit.

To reduce "oil available for secondary" to a prediction of oil recoverable from a water-flooding project, some coefficient may be applied. This coefficient will involve the relative effectiveness of a water-flooding project, as compared to a natural water drive. A water-flooding project usually begins near the end of solution-gas primary depletion, and is concerned with oil containing in solution only a small fraction of its original gas. On the other hand, an effective natural water drive operates within a short range of the original pressure, with nearly all the original gas in solution in the reservoir oil. Economic factors also act to reduce the recovery from a water-flooding project as compared with a natural water drive.

Data from two water-flood projects show actual secondary recovery 56 and 61 per cent of the oil available for secondary as predicted by the nomograph. This may indicate the expected order of the magnitude of the coefficient.

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Power in Rotary-Drilling

(Continued from page 97)

the extra power necessary for drilling this larger-size hole it has been the practice to add to the rig a separate pump unit, usually powered by two 300-hp. engines. This comprises approximately 50 per cent more power so it can be said that larger-diameter holes, particularly 12¼ in., require 150 hp. per 1,000 ft. of rating in order to accomplish the desirable 3 ft. per second upward velocity of the mud.

The fuel consumption for a 10,000-ft. diesel rig varies from 300 to 500 gal. per day depending mostly on the size of hole and the pump load. An average of 400 gal. per day is not uncommon. The fuel consumed on a diesel rig is only about 35 per cent of the amount which the engines would require if operated continuously at their rated load. For example a rig equipped with four 265-hp. engines should consume 1,400 gal. in 24 hours based on continuous operation at .41 lb. of fuel per horsepower-hour, whereas such a rig seldom averages more than 500 gal. per day. The reason for this low factor is that engines are only actually loaded for 25 per cent of the time while making a trip and, when drilling, the making of connections and various delays in the process cut down the duration of loading of the engines considerably.

During the last 2 years engines larger than 300 hp. have been gaining in popularity for powering heavy-duty drilling rigs. It appears that the general rule of 150 hp. per 1,000-ft. rating will apply when using 400 to 600-hp. engines for 15,000 to 20,000-ft. drilling. A 20,000-ft. drilling rig calls for five 600-hp. engines.

In order better to utilize internal-combustion-engine power, hydraulic drives—both couplings and torque converters—are being used and it is expected that the popularity of these will increase, particularly for deeper drilling. Hydraulic drives are of advantage where high mud pressure and reduced volumes are involved. In deep drilling it sometimes becomes necessary to move drill pipe at slow rates of speed and hydraulic drives are suitable for this purpose. When a rotary drilling rig is equipped with hydraulic drives it should be possible to cut the power requirement rule to 125 hp. per 1,000 ft. of depth.

TABLE 2—HYDRAULIC HORSEPOWER REQUIRED WITH 4½-IN. FULL-HOLE PIPE FOR UPWARD VELOCITIES OF 2¾, 2½, AND 2 FT. PER SECOND IN 9⅝, 11, AND 12¼-IN.-DIAMETER HOLES

Rating of rotary rig, depth, ft.	3 ft. per second, 9⅝-in. hole, 500 g.p.m.	2½ ft. per second, 11-in. hole, 620 g.p.m.	2 ft. per second, 12¼-in. hole, 840 g.p.m.
5,000	280	420	450
7,500	375	560	600
10,000	470	700	750
12,500	560	850	900

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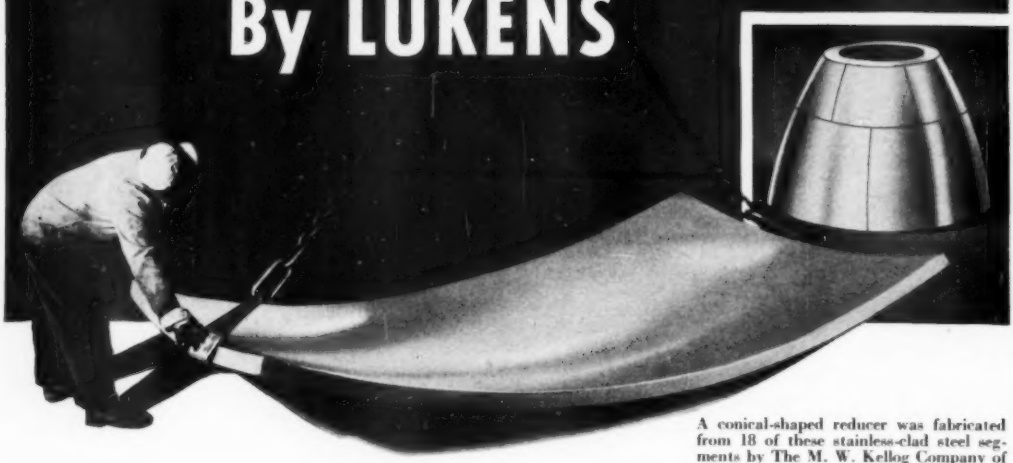


A conical-shaped reducer was fabricated from 18 of these stainless-clad steel segments by The M. W. Kellog Company of Jersey City, N. J., for The Texas Company.

HOT PRESSED by By-Products Steel Co.

Lukens Stainless-Clad Steel plate, nearly three inches thick, was flame-cut into segments, hot pressed and then welded into the conical shape shown here. Its corrosion-resistant surface of stainless steel remained intact.

All Lukens Clad Steels—Nickel-Clad, Stainless-Clad, Inconel-Clad and Monel-Clad—have the same permanence of bond and uniformity of cladding. Use them in your equipment and gain the advantages of these *solid* corrosion-resistant metals with the economies of *clad* steels. Lukens makes plate as wide as 178 inches or to over 3 inches thick. All are available in the extra-smooth sodium hydride finish.

By-Products Steel Co., Division of Lukens, offers you all kinds of metal forming services such as flame-cutting, shearing, pressing, blanking, bending and forming. Bulletin 270 describes these facilities.

For a copy, and for Bulletins 255 and 338 on Lukens Clad Steels, write Lukens Steel Company, 455 Lukens Building, Coatesville, Pennsylvania.

CLAD METAL STEEL

LUKENS

Nickel-Clad Stainless-Clad
Inconel-Clad Monel-Clad
STEELS

SOLID METAL ADVANTAGES WITH CLAD STEEL ECONOMY

PROGRESS in METALS

by W. L. Nelson
Consulting Engineer

Steel for Wires

IN the Journal of the Iron & Steel Institute (English), November 1948, J. C. Hudson points out the saving in materials and the reduced costs of replacement that can result from the substitution of low-alloy steel wire for unalloyed wire in applications involving atmospheric corrosion.

Ten-year corrosion tests in an industrial atmosphere were made on a number of ferrous materials, including carbon steels, unalloyed wrought irons, various low-alloy steels containing small percentages of copper and, in some cases, chromium, and copper-bearing wrought irons. The rate of corrosion did not vary appreciably with duration of exposure, but was affected by the diameter of the wire, being greater for thin than for thick wires. Certain wrought irons, including both the copper-bearing and some of the unalloyed wrought irons, and the low-alloy steels proved much more resistant than mild steel.

The most favorable results were obtained with the low-alloy steels containing about 0.25 carbon, 0.8 manganese, 0.6 to 0.9 chromium, and 0.5 per cent copper. The average economy in weight resulting from the substitution of chromium-copper steel for mild steel would be of the order of 50 per cent. The cost of the alloying elements would, of course, have to be set off against the saving that would result from the use of the low-alloy steel.

In all probability, however, the maximum long-term economies resulting from the use of low alloy steel wires would be achieved by maintaining the present wire gages and thus reaping the benefits of the increased life of the fabricated articles, for the cost of the materials themselves is but a small fraction of the expense involved in replacement at unnecessarily short intervals.

A digest taken from the March 1949 issue of Materials and Metals.

Fatigue of Metals

WITH the constantly increasing number of papers on special phases of fatigue, engineers will welcome the concise review of recent work in this field by P. Feltham in the October 1948 issue of Iron and Steel (English). Metals, as generally used, are inhomogeneous from the point of view of microstructures and material properties, so that the various crystal domains in a part subject to cycles of stress will not have the same strength and will deform plastically and work-harden at different rates. The repeated application of stresses above the fatigue limit is accompanied by a cumulative storage of energy within the specimen in addition to the energy dissipated as heat.

Part of the stored energy is recoverable, being latent strain energy, while the rest is not recoverable and appears to be used in forming the fracture surface of fissures. The fissures develop at weak points in the part, as on the boundaries of soft and hard material and in regions embrittled by cumulative cold work. The growth in numbers and dimensions of such faults finally entails the fracture by fatigue of the part.

The small size of the fatigue faults and their random dispersion make the task of predicting the life of a part a very difficult one. Most applied methods confine themselves merely to the detection of fatigue cracks late in the tests. A method for predicting fatigue which would be scientifically sound and yet applicable under practical engineering conditions has not yet been developed. It is suggested that the present picture of the mechanism of fatigue be used in guiding future research on this problem by way of a statistical approach to the mode of formation and propagation of fissures in polycrystalline metals.

A digest taken from the February 1949 issue of Materials & Methods.

Pumps for Oil Field Brine

THE excellent corrosion resistance of high-chromium-nickel alloys containing relatively large percentages of molybdenum (such as the alloy Worthite) in handling oil-field brines has been definitely established. Worthite and somewhat similar alloys have the following general composition:

	Per cent
Chromium	19-20
Nickel	24-30
Molybdenum	3-3.5
Copper	0-5
Silicon	0-3.5
Iron	rest

Although such alloys are obviously expensive, their long life in cold brine (and in some instances boiling) service, the saving possible by a minimum of repairs, and the advantages of dependable materials in isolated or untended locations, often make their use highly economical. The use of Worthite pumps is discussed much as follows by Worthington Pump & Machinery Corp. in its Worthite News of January 1949.

Worthite pumps were first put into oil-field service in East Texas field. Magnolia Petroleum Co. made the first installation in 1939 near Kilgore. Specially designed chemical plants are used for treating the salt water for removal of hydrogen sulfide, flocculation, filtering, and final disposal into a special low-resistance well delivering into the disposal sands thousands of feet below the surface. Worthite pumps are used for all services of these plants.

Such disposal plants are strategically located so the salt water from as many as possible of the surrounding wells can flow by gravity to the collecting pond at the disposal plant where it can be chlorinated to destroy algae. However, many Worthite pumps are used for this "gathering" service where contours make it necessary to use pumps. Most of these pumps are located in outlying and isolated areas where only infrequent attention can be given to them. At such locations operators want pumps that will not spring a leak through the casing or at the stuffing box.

In 1941 Magnolia installed a two-stage all-Worthite pump in the East Texas Talco field for salt-water disposal into a well designed to take 160 g.p.m. at 240 psi. This pump is driven by a gasoline engine through a stepup gear for pump speeds up to 3,600 r.p.m. No repairs have been required in the 7 years it has operated.

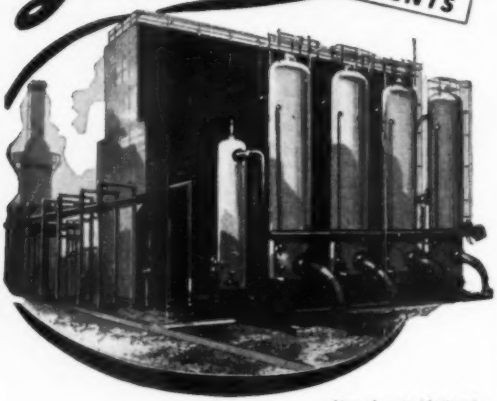
East Texas Salt Water Disposal Co. has now taken over the bulk of the salt-water-disposal work in East Texas oil field. It is handling about 400,000 bbl. of salt water per day. Large numbers of Worthite pumps are used in its operations for gathering, treating, and filtering. Worthite liners, rods, valve service, etc., have been used successfully in the high-pressure power pumps developing pressures up to 500 psi. as required in some disposal wells. Worthite has never failed from corrosion in any of these applications.

The results of a field corrosion test by International Nickel Co. on Worthite in East Texas oil-field salt water is indicated by the following two tests:

	Test No. 1	Test No. 2
Liquid agitation	Salt water, pH 8.1 Normal flow of water	Salt water, pH 8.1 Normal flow of water
Corrosion rate	Less than 0.0001 IPY	No loss
Source	Inco test spools	
Process	Oil-field salt-water disposal	Oil-field salt-water disposal
Duration of test	85 days	217 days
Aeration	Slight	Slight

Floridin

ADSORBENTS



Natural gas is dehydrated by use of a Floridin product in this modern plant of an important company operating in the Southwest.

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acts many parts

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Flocculant	Catalyst Binder	

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Dehydrogenation	Treatment of Waste
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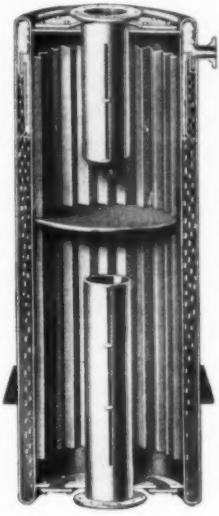

BULLETIN ON REQUEST

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ENGINEERING *fundamentals*

Phase Behavior

Two-Component System

A DISTINGUISHING phase characteristic of the single-component system is that two phases (vapor and liquid) can exist in equilibrium at only one pressure if the temperature is fixed. With a two-component system, for instance a mixture of butane and propane, two phases can exist in equilibrium at various pressures at the same temperature. The following discussion for a two-component system involves many concepts that apply to the more complex multicomponent systems of oils and gases.

Fig. 1 is a typical pressure-temperature relationship expressing the phase variations in a two-component system. In the one-component system a single line was sufficient to express the change from the vapor to the liquid phase. In the two-component system two lines, enclosing a two-phase region, are necessary. The changes in phases can best be illustrated by Fig. 2, which indicates the phase changes at various points taken in traveling the path from P_1 T_1 to P_2 T_1 in Fig. 1.

At the point P_1 T_1 the system is entirely in the liquid phase. Over the path from P_1 to P the liquid expands in volume but there remains only the single phase. At the pressure P, vapor first appears and two phases are present. This pressure is termed the "bubble" point, and the locus of all such pressures found at different temperatures is called the bubble-point line. As expansion proceeds from pressure P to pressure P', the ratio of vapor to liquid increases and the compositions of both the vapor and liquid phases change. Two phases, however, remain until the pressure P' is reached, at which pressure the last drop of liquid vaporizes. This pressure is termed the "dew point," and the corresponding locus of pressures is called the dew-point line. Further reduction of pressure from P' to P_2 simply expands the gas.

It is pertinent to note that as long as the system under discussion exists in one phase only [i.e., either all liquid as in 2(a) or all vapor as in 2(e)] the composition of the system is uniform throughout. Under those conditions which allow two phases to exist, however, the composition is not uniform throughout the system. That of the vapor phase will be different from that of the liquid phase. The vapor phase will contain at the higher pressure P (Fig. 2b) the highest percentage of that component which has the lower boiling point. As the pressure is reduced the vapor will gradually change in composition until all liquid has vaporized, at the pressure P'. Then the composition will again be uniform throughout the system.

A single diagram such as is shown in Fig. 1 details the characteristics of only one particular system of the two components considered. There are an infinite number of possible two-component systems involving two specific components, depending upon the relative amounts of each component chosen. The equivalent of Fig. 1 for a system made up of different amounts of the same two components would be similar but displaced to the right (higher temperatures and lower pressures) when the percentage of high boiling component was increased or to the left (lower temperature and higher pressure) when the percentage of low boiling component was increased.

The above outlined change of phases from P_1 T_1 to P_2 T_1 applies only if the temperature is below the critical temperature. Above the critical temperature one encounters retrograde condensation upon reduction in pressure. This will be discussed in a later number of this series.

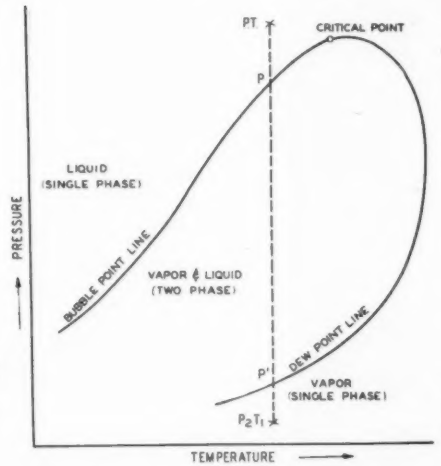
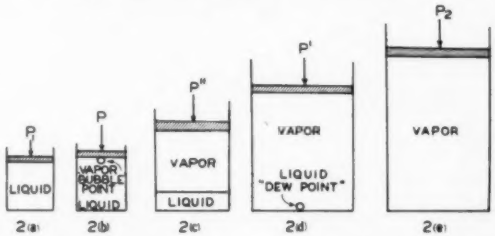
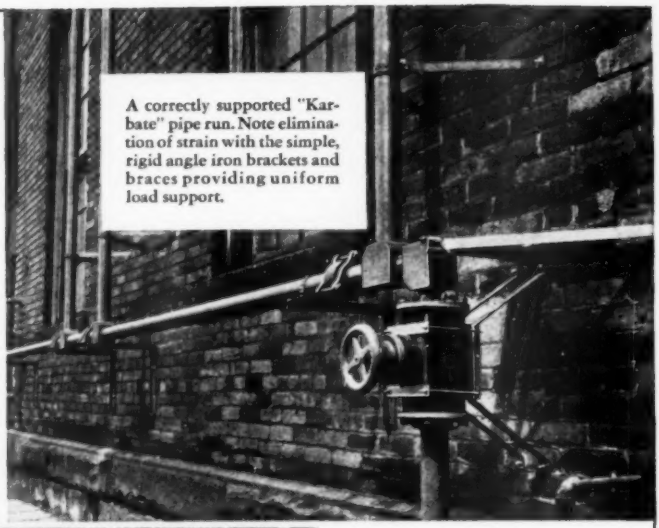


Fig. 1 — (Left) Schematic representation of pressure-temperature plot of two-component system. Fig. 2—(Below) Schematic representation of phase changes in expansion of two-component system at constant temperature

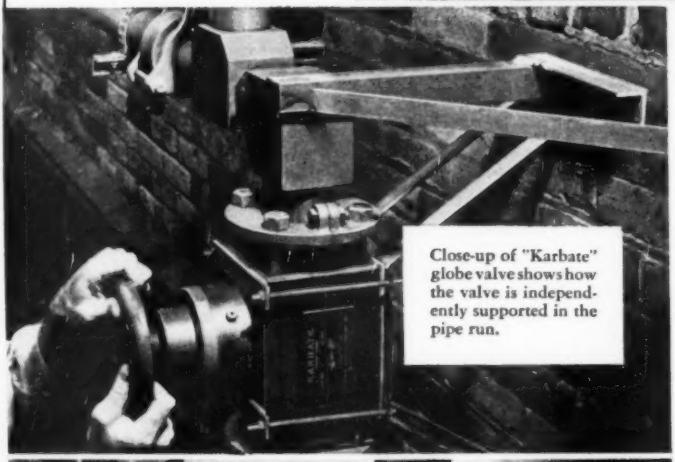


Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma

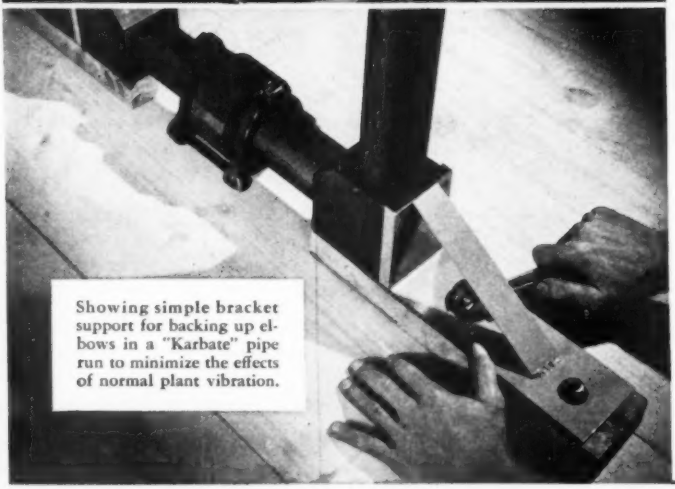
How to support a "Karbate" pipe line-



A correctly supported "Karbate" pipe run. Note elimination of strain with the simple, rigid angle iron brackets and braces providing uniform load support.



Close-up of "Karbate" globe valve shows how the valve is independently supported in the pipe run.



Showing simple bracket support for backing up elbows in a "Karbate" pipe run to minimize the effects of normal plant vibration.

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Cost-imating

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Instrument Costs

APPROXIMATE COSTS OF CONTROL INSTRUMENTS DURING 1946*

	Unit	Material	Labor	References
Industrial thermometers	$ each	16-26	5	1, 2
Thermocouple alone, light duty	$ each	17-23	.....	1
Thermocouple alone, heavy duty	$ each	20-30	.....	1
Thermocouple compensating leads	$/ft.	0.26	0.07	1
Thermocouple complete, light duty	$ each	24-53	1-5	1, 2
Thermocouple complete, heavy duty	$ each	80-120	3-6	2
Conduit for wiring:				
½-in. rigid	$/ft.	.10-.14	.40	1
¾-in. rigid	$/ft.	.13-.17	.40	1
1-in. rigid	$/ft.	.20-.24	.40	1
Temperature indicator	$ each	50-100	2-3	2
Temperature indicator, 12 pt. complete	$ each	420-470	20-30	1
Temperature recorder	$ each	100-140	17-25	1, 2, 3
Temperature controller (no valve)	$ each	100-150	4-6	2
Temperature recorder:				
Single point	$ each	350	25	1, 3
2-point	$ each	420	25	1
3-point	$ each	490	25	1
4-point	$ each	560	25	1
6-point	$ each	690	25	1
Temperature recorder controller	$ each	270-370	25-40	1, 2, 3
Pressure gages:				
Light duty	$ each	5-15	1-2	1, 2
Flush mounted	$ each	40-50	16	1
Heavy duty	$ each	10-50	2	2
Pressure recorder (single or double)	$ each	90-140	20-30	1, 2, 3
Pressure regulator	$ each	45	20	1
Pressure recorder controller	$ each	230-430	20-30	1, 2, 3
Draft gage	$ each	33-80	20-30	1
Pressure controller	$ each	100-150	10-20	1, 2
Gage glass	$ each	40-90	10-15	2
Level indicator (no float)	$ each	50-100	5-10	2
Level controller	$ each	200-300	15-30	1, 2
Displacement meter	$ each	75-190	10-20	1, 2
Rotameter	$ each	50-200	5-10	1, 2
Orifice plates	$ each	30-80	5-10	1, 2
Flow recorder	$ each	270-450	20-30	1, 2, 3
Flow recorder controller	$ each	550-750	30-40	1, 2, 3
Relief valves:				
Regular	$ each	70-130	20-30	1
Extreme pressure	$ each	180-290	30-40	1
Mercury per instrument	$ each	30-100	.....	2
Black Panel Board, 42 by 48 in.	$ each	18	10	1
Air compressor for instruments	$ each	170	105	1
Air filter	$ each	6	.....	1
Strainers for oil	$ each	40-60	10-20	1
Instrument board labor and auxiliaries	percentage	.....	20-30	2

*Yearly cost indexes were published in Cost-imating No. 34, June 9, 1949.

References: (1) Author's files. (2) Happel, Aries, and Borns, Chem. Engineering, December, 1946, p. 97. (3) Considine, D. M., Chem. Engineering, July 1947, p. 108.

No. 35 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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UNDERGROUND PIPE WRAP

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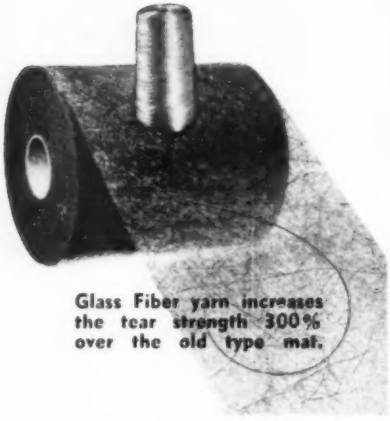

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Assures an adequate supply of cool, pure drinking water for workers *everywhere*—in factory or field. Protects their health, and keeps them on the job. Fountain has inner water container of stainless steel. Four gallon tank is fully insulated. Constant air pressure for instant flow of water is furnished by a few strokes of the pump at widely spaced intervals. *Operates at the press of a button*, like any bubbler drinking fountain. May be easily carried from place to place by shoulder strap, or mounted on truck, tractor or locomotive.

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PIPE LINES

Trans-Arabian Export Licenses are Approved

WASHINGTON.—Export licenses for shipment of 47,500 tons of 30-31-in. welded line pipe for the Trans-Arabian Pipe Line during the second and third quarters of this year were approved last week by the Office of International Trade.

The new quota was superimposed upon one of 35,000 tons for the second quarter approved earlier, and brings the total allocation of line pipe for Tapline to 161,500 tons out of a total of 260,000 tons which the project is expected to require.

Interprovincial Pipe-Line Survey is Now Under Way

Ground survey and other work on the 450-mile Edmonton-Regina crude-oil line is proceeding as rapidly as possible, Dr. O B. Hopkins, newly appointed president of the Interprovincial Pipe Line Co., Ltd., announced. Authority of the board to transport commissioners to construct the line was given last week.

Air mosaics have been taken and studied to determine the best route, Dr. Hopkins said. The line will take a fairly direct course avoiding lakes, towns, and other obstacles. Ground-survey parties will work at several points along the line for greater speed.

"The primary objective of the line is to help obtain a wider market for Alberta crude as soon as possible," Dr. Hopkins said. "This objective can only be attained by keeping transportation cost to a minimum and this in turn can only be done by construction of a pipe line along the most direct route possible in the direction of ultimate markets.

"Completion of the line to Regina will not expand the present market for Alberta crude as the prairie area is already saturated and crude is moving beyond Regina by tank car.

"Imperial considers the Edmonton-Regina line a 'first step' towards wider markets and is now studying extension of the line from Regina to the Great Lakes."

Before this year no dominion legislation governing interprovincial pipe lines existed, but at the last session of the Canadian Parliament a federal pipe-lines act and a special act incorporating the Interprovincial Pipe Line Co. were passed. This legislation gives the company authority to build interprovincial oil pipe lines. The right is subject to approval of the board of transport commissioners. The decision of the transport board sanctions the first Canadian pipe line under the new dominion legislation.

Officers of the Interprovincial Pipe Line Co. in addition to Dr. Hopkins, are Vice president and director, F. G. Hall; secretary, R. D. Murray; treasurer, K. A. Henderson; directors, A. E. Halverson, J. R. White, C. D.

Laying 26-in. pipe for 122-mile loop near Lancaster, Ohio, for Texas Eastern Transmission Corp., contracted by Associated Pipe Line Contractors, Inc. At the road crossing the pipe is being protected by the Kapco board method instead of the usual padding procedure

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Crichton, and R. B. Burgess. All are officials of Imperial Oil which is sponsoring the Interprovincial Pipe Line Co. The new company has an authorized capital of $200,000,000.

Tennessee Gas Transmission Lays 200 Miles of Loops

Tennessee Gas Transmission Co. is laying 200 miles of loops with three spreads of the following organizations: Morrison Construction Co., Inc., 80 miles of 30-in., field office at Hemphill, Tex.; H. C. Price Co., 62 miles of 24 and 30-in., field office at Refugio, Tex.; Tennessee Gas Transmission Co.'s own spread, 38 miles of 30-in., field office at Monroe, La.

Tennessee Gas Transmission is also installing compressor units totaling 25,000 hp. at several stations along the system.

In the middle of July it is expected that the company will issue specifications for 200 miles to be contracted for construction in the eastern section of its system.

Mid-Continent Pipe Line Lays Mounds-Tulsa Lines

Mid-Continent Pipe Line Co. let contract to C. P. Carter Construction Co. for work which includes three projects including: laying of 10 miles of 10-in. between Mounds and Sapulpa, Okla.; taking up 9 miles of 8-in. in the Mounds-Sapulpa section; and relaying this 8-in. salvaged pipe between Sapulpa and Tulsa to parallel the company's existing Sapulpa-Tulsa 10-in. line.

The existing system includes two 6-in. lines in the Seminole-Mounds section and a 6-in. line between Sapulpa and Drumright. The C. P. Carter organization began receiving pipe on June 15.

Stanolind Establishes Kearny, Neb., Office

Stanolind Pipe Line Co. is establishing a district office at Kearny, Neb., in connection with its postwar program for enlarging the throughput of its Wyoming trunk line through laying of loops and increasing pumping capacity. Nine Stanolind stations are now in operation in Nebraska.

The company's open house and the Kearny Chamber of Commerce banquet on June 16 are being attended by J. L. Burke, president; W. S. Partner, superintendent of the Nebraska division, and a group of Stanolind officers and board members.

Due to reduced quantities of oil moving north from the Gulf Coast area, Stanolind Pipe Line will close its Singleton, Tex., pump station. The

PARKHILL Strung . . . .

1,463
Miles of Pipe in
1948

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Houston, Texas

station, built in 1922 and placed in service in 1923, has been in almost constant operation since that date.

Oil gathered in the Dyersdale area now is pumped south to the General American Transportation Corp. loading docks on the Houston ship canal. In addition, the quantity of oil delivered to Stanolind Pipe Line in that region by the Humble Pipe Line Co. has been reduced. Stanolind's facilities at Hufsmith are adequate for pumping the oil to Mexia station.

Devol station in Oklahoma, on a branch line between Kadane, Tex., and Healdton, Okla., will also be closed. Completion of facilities by Texas Pipe Line Co. in this area has resulted in the discontinuance of tenders at Kadane and from the Electra-Fowks section of Texas Pipe Line's line.

County Gas Co. to Construct 11-Mile Line in New Jersey

The Federal Power Commission has authorized County Gas Co., of Atlantic Highland, N. J., to construct and operate an 11.4-mile natural-gas pipe line in New Jersey connecting the company's system with the Texas Eastern Transmission Co. "Big Inch" line. Estimated cost of the project is $280,000.

Texas Eastern previously was ordered by the commission to deliver up to 3,000,000 cu. ft. of natural gas per day to the New Jersey company, which now distributes manufactured gas in Monmouth and Middlesex counties. The new 6-in. line will connect with the Texas Eastern system near Perth Amboy and will extend southeasterly to the connection with County's distribution system in the vicinity of Keyport, N. J.

Traffic of Pipe-Line Firms Drops in First Quarter

Traffic of large oil pipe-line companies declined slightly during the first quarter of 1949, according to Interstate Commerce Commission figures.

Compiled from reports of 45 pipeline companies having annual operating revenues of more than $500,000, the ICC statement shows that revenues of these carriers was up 4.6 per cent in the quarter, but traffic amounted to 603,388,512 bbl. in the first quarter this year compared with 606,045,217 bbl. in the year-previous period. Revenue totaled $83,898,379 against $80,196,660 a year ago.

Humble Pipe Line Co. reported the largest traffic volume for the period, with 62,598,043 bbl., a decline of 17 per cent from the 75,755,959 bbl. reported in the same quarter a year ago.

PROTECT YOUR PIPE LINE
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CASING INSULATORS*

This device—simple, rugged, economical—supports and guides the leading end of coated line pipe into the right-of-way casing under railroads and highways.

Additional Casing insulators, clamped around the pipe every 20 to 30 feet, serve three purposes:
1—To protect the pipe coating.
2—To act as pipe skids, facilitating installation.
3—To separate pipe and casing, assuring permanent insulation for cathodic protection.

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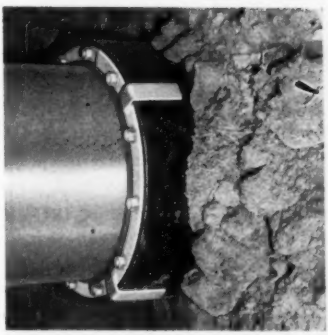
CASING BUSHINGS*



Equipped with exclusive T-gasket for positive watertight seal and insulation of pipe from steel flanges, this improved "casing seal" is designed for easy installation at each end of pipe-line casing under right-of-way crossings.

WmSEAL Casing bushings are readily installed because they offer:
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*Patents Pending

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50 Gallon "SQUATTY"

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REFINING

Production of Synthetic Rubber Declined in 1948

WASHINGTON. — Production last year of GR-S synthetic rubber, used chiefly in tires, amounted to 882,000,000 lb., or 3.7 per cent less than in 1947, according to preliminary statistics compiled by the Tariff Commission.

GR-S accounted for 75 per cent of the output of all synthetic rubber, approximately the same as in 1947. Sales of the GR-S type amounted to 750,000,000 lb. valued at $139,000,000.

Production of other types of synthetic rubber was placed at 291,000,000 lb., or 3,400,000 lb. more than in 1947, and last year's sales totaled 294,000,000 lb. valued at $98,000,000, slightly smaller in quantity but larger in value than in 1947, the commission reported.

The total output of all synthetic rubbers was 1,200,000,000 lb., approximately the same as in 1947, but sales showed a slight decrease.

The commission also released preliminary statistics placing the 1948 production of rubber-processing chemicals at 96,000,000 lb., compared with 101,000,000 lb. in 1947. Sales last year totaled 71,700,000 lb. valued at $36,400,000, somewhat less than reported for 1947

The output of cyclic rubber-processing chemicals (chiefly accelerators and antioxidants) was 81,900,000 lb. in 1948 against 85,800,000 lb. in the preceding year, and sales of these compounds amounted to 60,000,000 lb. valued at $27,000,000.

Production of acyclic rubber-processing chemicals (which include accelerators, peptizers, antioxidants, and other products) amounted to 14,200,000 lb. compared with 14,900,000 lb. in 1947, but while the output of these chemicals as a group declined slightly in 1948 the production of some of the individual chemicals increased, particularly acyclic accelerators, which amounted to 5,900,000 lb. compared with 4,400,000 lb. in 1947. Sales of all acyclic rubber-processing chemicals last year amounted to 11,400,000 lb. valued at $9,400,000.

Small Refinery to Be Built In Seminole, Okla., Area

Contracts have been signed by the Seminole, Okla., Chamber of Commerce and Oklahoma Refining Co., for a new refinery in the area.

Stanley D. Belden, head of Oklahoma Refining, said that the new plant will start with 200 bbl. daily production, and will employ 15 persons.

It is hoped that output of the plant can be increased to 1,000 bbl. daily in the future, Belden indicated.

Work Is Being Completed at Montreal East Refinery

Work on the new crude-oil topping and decarbonizing unit at the Montreal East, Que., refinery of British American Oil Co., Ltd., is now being completed. It is expected that this phase of the modernization program of the refinery will be in operation by September 1 and when these installations are in operation the plant will have a crude-oil capacity in excess of 30,000 bbl. daily.

A fluid-type catalytic cracking unit and a catalytic polymerization unit are also under construction at the refinery and will be placed in operation before the end of the year. The catalytic cracking capacity will be 13,300 bbl. daily. Other improvements to be completed before the end of the year include a new laboratory building, new store and shop building, additional boiler plant capacity, new tankage, and loading facilities. A new administration building has been completed and is now occupied.

Contrary to reports, the British American company is not considering the construction of a new refinery at Port Moody, B. C. M. S. Beringer is vice president of the company in charge of manufacturing.

Indiana Standard's Plant Damaged by Tornado

A tornado which recently cut a swath through the Wood River, Ill., area damaged the refinery of Standard Oil Co. (Ind.), causing an immediate shutdown after the storm. The plant is now only in partial operation. Reports indicated that Indiana Standard's plant was the only plant in the area seriously affected by the storm.

Full operation of the plant is scheduled to resume within a few weeks. Damage was limited to a water pump house and line, some loading racks, and several tanks which were crushed above the liquid line.

Shell Oil Co.'s refinery had its

power shut off for 11 hours following the storm, but it is back in full operation. The Wood River Oil & Refining Co.'s refinery at Hartford, and Socony-Vacuum Oil Co., Inc.'s plant at East St. Louis escaped the storm.

Refinery Shipments Made Big Gain in 1947, Report Shows

Manufacturers in the petroleum-refining industry shipped products valued at $6,624,000,000 during 1947, preliminary figures released last week by the Bureau of the Census in Washington disclosed. This is an increase of 169 per cent over the $2,462,000,000 value of products reported by the industry in 1939, when the last census of manufacturers was taken. Value added by manufacturer in the industry during 1947 amounted to $1,494,000,000, an increase of 183 per cent over the $529,000,000 value added in 1939.

Production-worker employment in the refining industry averaged 113,847 in 1947 compared with 72,982 in 1939. Wages paid to workers increased 209 per cent from the $128,000,000 in 1939 to $396,000,000 in 1947. The industry's expenditures for new plants and equipment during 1947 totaled $316,000,000 compared with $108,000,000 in 1939, the report shows.

The refining industry as covered by the 1947 census included establishments refining crude oil and petroleum products, and plants re-refining used oils (crankcase drainings).

Refinery Capacity Must Be Expanded, Shell Man Says

In order to meet a growing potential demand, the petroleum industry must further expand its refinery capacity, Sir Frederick Godber, chairman, Shell Transport & Trading Co., Ltd., said in London in a statement accompanying the firm's annual report.

It is difficult to forecast how rapidly the world consumption of petroleum will continue to expand, he said, but there is no doubt that room for expansion is "very great" if the needs of the wide range of potential consumers are to be met.

"As an indication," Godber said, "are the requirement of countries participating in the European Recovery Program—requirements to an aggregate consumption of petroleum products in 1953 about 33 per cent above present consumption levels. Similarly requirements of markets in Africa, the Far East, and South America are likely to grow at least as rapidly," he continued.

Although refinery capacity was considerably increased during 1948, world-wide refinery capacity is still not sufficient to supply all demands, the chairman said.

400 Employes Laid Off at Esso's Baton Rouge Plant

Esso Standard Oil Co. has completed lay-off of 400 employes, or about 5 per cent of the refinery personnel at its Baton Rouge, La., plant. The lay-off was due to curtailment of refinery operations.

Portions of the plant affected include shut-downs of the smaller of the isopropyl alcohol plants, two of the lube oil finishing plants, and some packaging and shipping activities.

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The porous disk is made in several standard Grades. Special grades made to suit application.
Grade "G" Air, gases, Butane, gasoline.
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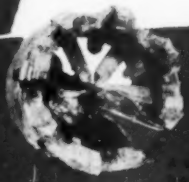

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Among the Drilling Contractors

Westlund Buys Out Johnson In Two Midland Companies

MIDLAND, Tex.—Carl J. Westlund has acquired all stock formerly owned by George G. Johnson in Westlund-Johnson Drilling Co. and Westlund & Johnson, Inc., of this city. Names of the two companies will remain unchanged temporarily although Johnson has severed all connections with them. O. Lee Wood, vice president, announces that W. C. Murphy, formerly drilling superintendent for Carl B. King Drilling Co., is now associated with these companies as superintendent of drilling and production.

New Contracting Company Formed on Pacific Coast

LOS ANGELES.—C. W. Inman and L. L. Kirchhof, both of whom have been active in drilling and production on the Pacific Coast for many years, have organized the C. W. Inman Co. to engage in contract drilling. Their first rig now is running on a well in the Thousand Oaks area of Ventura County.

Inman was associated with Shell Oil Co. from 1916 to 1931, and since then, successively, has been with the Kettleman North Dome Association, the former Bell & Loffland, Inc., and the British American Oil Producing Co. Kirchhof, who is in charge of field operations for the new company, has been engaged in drilling and production since 1920. He was superintendent for Bel Air Oil Co. from 1936 to 1946, and since then, until now, has been drilling superintendent for Sunray Oil Corp. in California.

Committees Named for Kansas Drilling Chapter

WICHITA.—Appointment of standing committees for the recently organized Kansas chapter of the American Association of Oilwell Drilling Contractors have been announced by Heber Beardmore, Beardmore Drilling Co., chapter chairman. Committees and their members are:

Program—W. J. Coppinger, Coppinger & Southern, Wichita, chairman; James Adkins, Adkins Drilling Co., Great Bend; Dwight Wilson, Quaker Drilling Co., Wichita; J. D. Ferrell, J. D. Ferrell Drilling Co., Great Bend.

Membership—Fred Stickle, Stickle Drilling Co., Great Bend, chairman; Chester Williams, Flournoy & Williams, Wichita; F. M. Sellany, Earl F. Wakefield, Wichita; W. S. Brunson, Brunson Drilling Co., Wichita.

Publicity—William Burks, Derby Drilling Co., Wichita, chairman; F. M. Steven-

Extension of the Elk City field, Beckham County, Oklahoma, 1½ miles northeastward in Washita County, is indicated in an outpost test being drilled by Caroco Drilling Co., Dallas, for F. Constantin, Jr., also of Dallas. In the picture, taken on the derrick floor, are, left to right: Carl Cooper, toolpusher; Scott Fowler, driller; L. P. Webb, W. L. James, S. N. Kimbrough, and E. L. Tomlinson, members of the day-tour crew. A drill-stem test at 9,410-80 ft. in one of the field's four known pay zones resulted in a recovery of 630 ft. of distillate following a gas flow estimated at 10,000,000 cu. ft. per day

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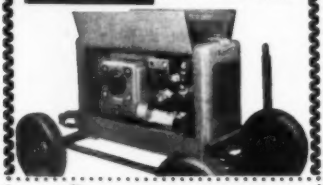

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ADDRESS

son, Signal Drilling Co., Great Bend; H. D. Shreve, Heathman-Honaker Drilling Co., Wichita; Charles Searle, Petroleum, Inc., Wichita.

Officers, in addition to Beardmore, are: C. H. Todd, Rine Drilling Co., Wichita, vice chairman; and Carl Sebits, Pickrell Drilling Co., Wichita, secretary.

Kern-Trimble Incorporate Arkansas Drilling Company

STEPHENS, Ark.—Organization of the Kern-Trimble Drilling Co., Inc., with operating headquarters in this city and Magnolia, Ark., has been announced by H. J. Trimble, president. Other officers are: Vera Kern, vice president; J. R. Kern, secretary-treasurer; and Lola Trimble, assistant secretary.

An associated company, the Kern-Cramer Well Servicing Co., Inc., also has been formed with C. H. Cramer, president; J. R. Kern, vice president; Charles T. Reveley, secretary-treasurer; and H. J. Trimble, assistant secretary.

The companies are starting operations with one drilling rig and two well-servicing units.

Ed Rumley Co., Oklahoma City, has contracted to drill a wildcat test in western Noble County, Oklahoma, for Sells Petroleum, Inc., Gladewater, Tex. Location is in Section 7-21n-2w between the Lucien and Polo fields. Contract is for 5,700 ft. with the Wilcox sands as the objective.

Standard-Fryer Drilling Co., Dallas, has contract to drill a wildcat test for Roy Crawford of Fort Worth and H. G. Spiller, Austin, in Section 73, CT Survey, Runnels County, West Central Texas. Location is 3 miles south of the new North Withers field. The test is projected for 3,500 ft., but may be carried to 5,200 ft.

Louis Scott, Los Angeles, has been awarded the contract for a wildcat test to be drilled on Santa Rosa Island, off the coast from Santa Barbara, Calif., for a syndicate headed by J. R. Pemberton. Three other tests, all dry, have been drilled on the island by other operators.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 6-6-49	Change week ended 5-30-49	Change week ended 6-7-48
Gulf Coast	575	—10	+41
West. Tex.-New Mex.	331	—12	—42
Ark.-N. La.-E. Tex.	172	+ 4	+16
Oklahoma	229	—12	—49
Kansas	131	+17	— 8
Illinois-Eastern	131	+ 5	—15
Rocky Mountains	112	+ 1	—41
Pacific Coast	191	— 7	+ 1
Total U. S.	2,072	—14	—97
Western Canada	86	+ 7	+41
Total	2,158	— 7	—56

*Courtesy Hughes Tool Co

Summit Drilling Co., Wichita, has the contract for a rank wildcat test which will be drilled for Gillespie & Sons in Section 6-34-5, Harper County, Kansas. Nearest production is the Caldwell pool, 13 miles east and 7½ miles south in Sumner County.

Ira Van Tuyl, Evansville, Ind., is starting a 2,300-ft. Devonian test for Walter Duncan on the Jones Community tract in Section 33-10n-9w, Vigo County, Indiana.

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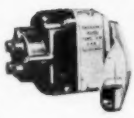

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Engineering Fundamentals—Advanced Reservoir Engr. (John C. Calhoun)	1.00
Engineering Fundamentals in Modern Drilling (Glenn Stearns)	1.00
Reference Manual on Electric Logging (S. J. Pirson & others)	1.00
Modern Refining Processes (George Amistead, Jr.)	1.00
Oil Well Pumping Methods (J. Zaba)	1.00
Manual on Heat Transfer (Paul Buthod & B. W. Whiteley)	.50

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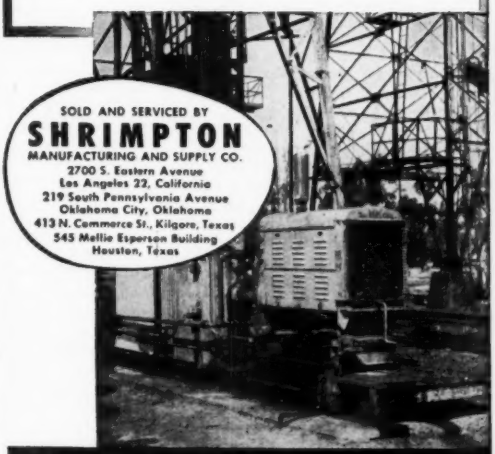

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NATURAL GAS

Gas-Treating Plant Being Built for Sulfur Firm

Texas Gulf Sulphur Co. has issued contract to the Girdler Corp. for erection of a gas-treating plant at Worland Dome, Washakie County, Wyoming, near the town of Worland, to extract hydrogen sulfide from natural gas coming from wells operated by Pure Oil Co.

A sulfur recovery plant to reduce the hydrogen sulfide to elemental sulfur is also being constructed. Girdler is general contractor, supplying engineering design and all equipment.

Subcontracts were let by Girdler to Charles M. Smith, Thermopolis, Wyo., for preparing location and piling; general erection subcontract went to C. F. Braun & Co., and Foster Wheeler Corp. is designing equipment of the sulfur recovery portion of the plant.

Extraction of the hydrogen sulfide from natural gas will be by means of the Girbotol process developed by Girdler, which is in use for the purification of industrial and natural gases in some 200 plants.

All materials and supplies available from local sources are being purchased in Wyoming.

Hearing June 21 on Storage Plant Proposed for Chicago

Federal Power Commission has scheduled a hearing June 21 in Washington, D. C., on application of Chicago District Pipeline Co. for commission authority to construct and operate a $6,000,000 plant near Chicago for the liquefaction, storage, and regasification of natural gas.

Chicago District Pipeline is proposing to store natural gas in liquid form during the warm-weather months for use in the Chicago metropolitan area during periods of peak winter demand. Storage facilities would be offered to Chicago District Pipeline's customer companies under a rate schedule based on cost of service. *(See The Oil and Gas Journal, June 9, page 110.)*

United Gas Corp. Is Now Owned by Its Stockholders

Ownership of United Gas Corp., largest handler of natural gas in the world, has passed from Electric Power & Light Co. into the hands of the public, N. C. McGowen, president, announced in Shreveport.

Distribution of 5,316,682 shares of United Gas common stock to holders of preferred and second preferred stock of Electric Light & Power was begun in an exchange of securities to end the corporate existence of the latter company, and place United Gas ownership in the hands of thousands of stockholders.

Distribution of the stock is the result of action which originated nearly 7 years ago when the Securities and Exchange Commission ordered disolution of the E.P.& L. under provisions of the Public Utility Holding Act of 1935.

United Gas Corp. and subsidiaries produce, transmit, or distribute natural gas in Texas, Louisiana, Mississippi, Alabama, and Florida.

Natural Gasoline

New L.P.G. Cracking Method Aids in Meeting Peak Loads

A new cracking process which is likely to prove valuable to both the gas and petrochemical industries has been developed which will reform propane or other volatile hydrocarbons in admixture with air to make supplementary gas to meet emergency peak-load demands for home heating on exceptionally severe winter days.

Developed by Universal Oil Products Co., Chicago, the new process is termed "autothermic cracking." For petrochemical manufacturers it will crack ethane or other economically available volatile stocks converting it to ethylene, which is one of the most useful and versatile of aliphatic source chemicals, being the starting material for the manufacture of alcohol, antifreeze mixtures, and other products.

Supplying sufficient gas to meet sudden emergency peak-load demands for home heating and at the same time maintaining interchangeability in burning characteristics in the supplementary gas is the most formidable technological problem confronting gas companies. Pipe lines and gas plants are designed to meet calculated normal base loads; to construct and maintain sufficient overcapacity in pipe lines and conventional manufactured gas plants to meet the unpredictable emergencies which occur only a few days in the year when temperatures drop abnormally low, is quite impracticable.

Two alternative methods to meet such emergencies include storage of gas close to central distribution points, or manufacture of gas from stored raw materials. Both are being further investigated.

Falling in the second category, the autothermic process is said to be extremely flexible with respect to throughput, pressures of operation, and raw material. It is these characteristics, combined with quick starting and low capital cost, that make it particularly adapted to the job of meeting the unpredictable emergencies.

The process consists in reforming propane, naphtha, natural gasoline, or other volatile hydrocarbons in admixture with air to make supplementary gas approaching the normal sendout in quality.

Air Shipment of Propane to Berlin Termed Possibility

The possibility of shipping liquid propane into Berlin instead of coal in case the Allied airlift is resumed on a large scale was advanced in New York last week.

Virgil Stark, president, North American Petroleum Gas Corp., New York, who recently completed a 10-day assignment in Berlin as an Army Department consultant, said it had been found that up to 5,100 tons a month of propane could be used in Berlin's gas plants with a net saving of 500 tons daily in transportation after deducting propane and container weight.

Stark said his report had been submitted to the Army but the project set aside with resumption of rail service to the city. Continued transportation to Berlin of coal by air would renew interest in the liquid gas shipments, he said. Stark said the 500 tons daily airlift saving would equal 1,500 plane fights a month and $2,500,000 in expense reduction.

La Gloria's Expanded Plant Facilities Now in Operation

HOUSTON.—Expanded facilities recently put into operation have stepped up the capacity of La Gloria Corp.'s Falfurrias, Tex., cycling plant to 330,000 M.c.f. of gas daily—a 10 per cent increase.

Nine 800-hp. gas-engine compressors have been installed in the current expansion program at the big South Texas plant. These compressors will handle casing-head gas from the La Gloria and Tijerina-Canales-Blucher fields in Jim Wells and Brooks counties.

About 35 miles of gathering lines have been laid and connected to approximately 275 oil wells. These wells are producing 30,000 M.c.f. daily of casing-head gas.

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DO YOU HAVE BOTTLENECKS IN YOUR ABSORBERS OR FRACTIONATORS? HERE'S OUR PROPOSITION:

We'll bet any and all gasoline plant operators or refiners that we can replace your present bubble trays with Koch Kaskade trays and give you greater efficiency and at least 30% more capacity.

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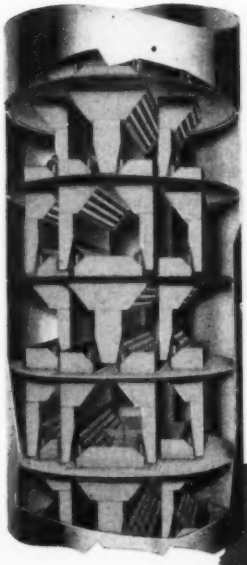

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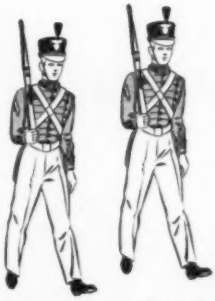
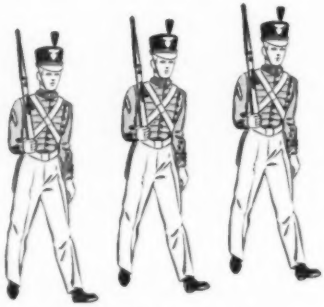
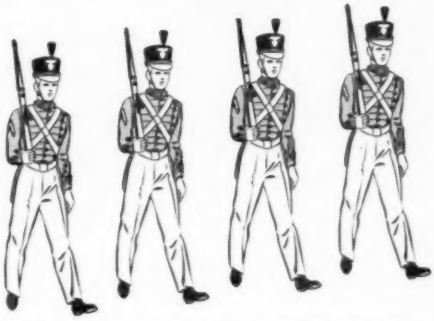


It's smart to drill . . .



It's smart to drill with . . .



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For complete information on the use of Driscose in a wide variety of applications, write for our Bulletin D-1.

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Exploration and Drilling

Nebraska and Utah Hits Divide Attention

ROCKY Mountain operators are dividing their attention between two wildcat successes that are about as far apart east and west as one can get in this district, one in southwestern Nebraska, the other in northeastern Utah.

In Uinta County, Utah, Carter Oil-Standard Oil & Gas Co. 1 Ute Tribal, in 21-1s-1e, on drill-stem test indicated it was good for 20-25 bbl. per hour of sweet 31.7°-gravity oil, from a basal Tertiary sand at 9,357-92 ft., ground elevation 5,410 ft. Static bottom-hole pressure, after being shut in for 20 minutes, was 4,350 psi., flowing pressure 2,700 psi., sulfur content 0.032 per cent, b.s. and w. content 3.3 per cent, pour point 90° F.

Test was made with tool open 6 hours, 5 minutes; gas came to surface in 58 minutes; 700-ft. water cushion appeared at surface in 1 hour, 51 minutes; mud to surface in 2 hours, 1 minute; oil appeared at surface in 2 hours, 11 minutes. In first 24 minutes, oil flowed at rate of 30-38 bbl. per hour, was bypassed to pits for 36 minutes while strainer was cleaned, then flowed 22 bbl. of oil in 38 minutes; bypassed for 7 minutes to remove strainer, and in last 82 minutes gaged 34 bbl. of oil.

This well is located in the northeast part of the Uinta basin, only about 25 miles from the Ashley Valley field, where the Weber sand (Pennsylvanian) produces at about 4,200 ft. The Tertiary section is estimated to be about 10,000 ft. thick, and the producing sand may be Wasatch or Green River in age. It suggests some similiarities to Powder Wash and Hiawatha fields. The test was located on an anomaly found by gravity meter and detailed by seismic work. The two operators have about 15-20,000 acres on the prospect.

The other well, in geologically almost virgin territory, is Ohio Oil Co. 1 Egging, NE NE NE 11-15n-49w, Cheyenne County, Nebraska. This well is now waiting on pumping equipment after reportedly swabbing 15 bbl. per hour of 33°-gravity, sweet, amber-colored crude. The well never did flow, and first swabbing tests were accompanied by water, which turned out to be wash water and was eventually exhausted. Fluid level is reported standing at 2,500 ft., from sand topped at 4,401 ft., and total depth of 4,429 ft. for well.

This has been a "tight" well, but reports indicate the sand topped at 4,401 ft., from ground elevation of 4,205 ft., is probably the Muddy. A string of 9⅝-in. pipe was cemented at 4,403 ft., with some difficulty in running, after two drill-stem tests were only partly successful. Previously coring at 4,403-29 ft., reportedly recovered saturated, loose sand.

Ohio has a block of 170,000 acres roughly in the central part of Cheyenne County, trending northeast-southwest, taken last summer. The acreage was taken and well drilled after 3 years of work, including a lot of seismograph operations. The new strike is in the northeast part of the Denver (Julesburg) basin, in an area where the Tectonic map of the United States shows some interesting nosing up-dip toward the axis of the Chadron Arch. The trend of the acreage block is roughly at right angles to the arch. Ohio is reported to have two other geophysical prospects in the area ready to test.

Charles J. Deegan.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—Sinclair 1 Williams, Borden County discovery, encountered salt water in drilling below 10,000 ft., and set casing to 10,023 ft. Last report on Humble 1 Sallie Odom, Runnels County Strawn discovery, showed a possible pay section, in streaks, of 217 ft. First flowing production was on a drill-stem test at 5,418-40 ft., which made an estimated 15-20 bbl. an hour. It was drilled to 5,458 ft., and with packer at 5,441 ft., made an estimated flow of 35 bbl. of 44°-gravity oil an hour, with no water. C. L. Norsworthy 1 Williams, Scurry County wildcat, was drilling below 7,207 ft. Last test from 7,136-51 ft. recovered 70 ft. of slightly oil and gas-cut mud and 90 ft. of muddy salt water.

EAST TEXAS.—Atlantic Refining Co. 1 M. P. Isom, 7 miles northwest of Hallsville in Harrison County, reported a good flow of wet gas from the Young section of the Rodessa at 6,774-6,820 ft., and was to drill ahead to the Pettit.

TEXAS GULF COAST.—A major oil discovery, Houston Oil Co. of Texas and American Republics Corp. 1 Nona Fletcher Lumber Co., 2½ miles southeast of Village Mills, Hardin County, has been completed flowing 325 bbl. of 41°-gravity oil per day through 3/16-in. choke. Production is through perforations at 7,058-66 ft., with tubing pressure of 1,050 psi. and casing pressure of 1,125 psi. Total depth is 7,495 ft.

ROCKY MOUNTAIN AREA.—Ohio Oil Co.'s 1 Egging, Cheyenne County, Nebraska, is an apparent discovery in the Muddy sand, after swabbing at the rate of 15 bbl. of 33°-gravity green oil per hour. The operator is installing pump. Additional saturated basal Tertiary was cored by Carter Oil Co. and Stanolind Oil & Gas Co. at their Roosevelt, Utah, wildcat, the 1 Ute Tribal. On drill-stem test the well flowed for approximately 4 hours, at an ungaged rate. Pure Oil Co.'s third West Poison Spider, Wyoming, well failed to find saturation in the Mesa Verde, productive in the second well.

CANADA.—In view of the impending special session of the Alberta legislature to act on gas export policies, more interest than usual attaches to three new gas discoveries in wildcats seeking oil. The tests are Socony-Vacuum Oil Co. 2 Craigmyle in 31-32-16w4; A. G. Bailey et al, 1 Castor in 4-38-14w4; Tower Petroleums et al, 1 Jarrow in 20-45-10w4.

SOUTHWEST TEXAS

Magnolia Outpost Test Completed as Producer

CORPUS CHRISTI.—Magnolia Petroleum Co. 1 Frank Roberts, outpost test off the northwest side of the old Luling field, in Caldwell County, has been completed as a producer, extending that side of the field. Drilled to a total depth of 2,229 ft., the well is producing 74 bbl. of 27.5°-gravity oil per day through ¼-in. choke, through perforations at 2,200-06½ ft., with tubing pressure of 225 psi.

Humble Oil & Refining Co. 2 Frank Doering in Frio County, has been gaged at 6,000 M.c.f. of gas per day on open flow with a trace of condensate, opening a new pay zone for the Doering area, and extending that field southward. Production is through perforations at 4,106-13 ft., and shut in pressure is 1,652 psi.

James G. McCarrick, Tr., and J. W. Gorman 1 Haralson-State has tested good for gas production in a new section above discovery pay in the West Charamousca area. Drill-stem test at 1,292-97 ft. developed working pressure of 400 psi. The well is an offset to the Richardson-Rowden-Gorman 1 Worden-Drought gas discovery in Duval County.

The 38 new locations in Districts 1 and 4 included 13 wildcat starts, 1 each in Brooks, Duval, Nueces, San Patricio, Willacy, LaSalle, Caldwell, and McMullen counties, 3 in Atascosa and 2 in Caldwell County. Three successful exploratory tests were completed, one each in Frio, Brooks, and Duval counties, while 14 wildcats were dry, one each in Frio, Guadalupe, McMullen, Travis, Jim Hogg and Zapata, 2 in Williamson, and 3 in Webb County.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Brooks County: New gas-condensate pay—L. M. Lockhart 1 Adolfo Garcia, East Alta Mesa, 1 mile northeast of Alta Mesa field, top sand 6,820 ft., TD 6,515 ft., IP: 106 bbl. oil per day through 9/64-in. choke, perf. 6,280-300 ft., CP 375 psi., GOR 118, 45.2° gravity.

Duval County: Oil discovery—M. L. Massingill & American Republics Corp. 1 Brigidia Garcia, AB&M Sur. 412, ¾ mile west of Chiltipin field, top sand 4,630 ft., TD 4,883 ft., perf. 4,630-34 ft., IP: 4 bbl. oil per day, through ⅛-in. choke.

Frio County: New gas pay—Humble Oil & Refining Co. 2 Frank Doering, Acct. 2, at Doering, BBB&C RR Co. Sur. 1061, on Block 15, Leona Valley Farms Subdivision of Doering Ranch, top sand 4,106 ft., TD 6,507 ft., IP: 6,000 M.c.f. gas per day on open flow, shut-in pressure 1,652 psi.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Duval County: Argo Oil Corp. 1 John M. Bennett, Jr., et al, SK&K Sur. 432, 4 miles west of Conoco Driscoll field, dry, TD 3,764 ft.

Falco Oil Well Service 2 Blanche O'Meare Hamilton, Thomas Steele Sur. 122, 20 miles northwest of San Diego, dry, TD 3,834 ft.

Trio Oil Co., B. Coleman Renick & Rock Hill Oil Co. 1 E. J. Miller et al, Diego Ynojosa Gr., A-629, dry, TD 4,533 ft.

Frio County: Joseph J. Bell 1 Collins R. Woodward, Long & Randall Sur. 4, A-1013, 6½ miles east of Pearsall, dry, TD 4,510 ft.

Guadalupe County: S. M. Messer 3 Walter Zuehl, Claiborne Rector Sur. 83, 2½ miles southwest of Marion, dry, TD 879 ft.

Jim Hogg County: Smith-Story-Wood Corp. 1 C. W. Hellen, Sur. 150, 6 miles northwest of Hebbronville, OWDD, dry, TD 3,260 ft.

McMullen County: Forest Oil Corp. et al 2 J. C. Dilworth, Jr., et al, T. Benites Sur. 43, A-66, 6 miles west of Tilden, dry, TD 6,026 ft.

Travis County: B. R. Floyd 1 R. W. Castleman et al, A. C. Caldwell Sur. 52, approximately 1 mile south of Kimbro field, dry, TD 1,758 ft.

Webb County: Brown & Wheeler 1 M. G. Martin Sur. 224, A-1568, 7 miles southeast of Encinal, dry, TD 5,523 ft.

Dulaney Oil Co. 1 Lod Moglia Est., Sur. 670, 11 miles north of Bruni, dry, TD 2,451 ft.

Windsor Oil Co. 1 La Mesa Land & Cattle Co., R. W. Davis Sur. 16, A-2338, dry, TD 3,839 ft.

Williamson County: Anderson-Prichard Oil Corp. 1 Schwenke, Jos. Jordan Sur., 1 mile south of Coupland, dry, TD 1,286 ft.

P. D. Cox 1 R. H. Moerby, Justo Liendo Sur., 1 mile south of Thorndale, dry, TD 1,188 ft.

Zapata County: Bridwell Oil Co. and W. C. McBride, Inc., A-9 Robert A. Hinnant, Sur. 613, 2 miles northwest of Mirando Valley field, dry, TD 3,505 ft.

MICHIGAN

Three Tests Showing As Prospective Oilers

MOUNT PLEASANT.—Three Michigan wildcat oil tests were showing potentially commercial pays this week. Deepened from 18 in. to 2 ft. in the Traverse, John A. Thomoson 1 Cox, NW NW NE 28-16n-10w, Green Township wildcat, Mecosta County, kicked off and started to flow at the rate of 20 to 25 bbl. of oil per hour. Prior to deepening the well had logged a 2,700,000-cu. ft. Traverse gas pay with oil production ranging from 52 to 100 bbl. per day. The well was deepened to a new total depth of 2,890 ft. after 5-in. casing, scheduled to run to 2,888 ft., previous total depth, froze at 2,874 ft.

In Gladwin County, H. E. Bell logged a Dundee oil pay and appeared to have a new discovery well in his 1 Bronson & Fryling, NE NW NW 13-20n-1w, Butman Township. Dundee was picked at 3,535 ft. and pay was drilled between 3,596-3,602 ft. Hole filled 2,500 ft. with free oil in 50 hours and the well made at least one flow of approximately 22 bbl. while tubing was being run prior to production tests. Bell and associates control a block of approximately 4,000 acres around this wildcat. Superior Oil Co., with approximately 1,000 acres close in, including three offsets, appeared to be the only other large acreage holder in the play.

Ohio Oil Co.'s forty-fourth Allegan County wildcat in the company's current exploratory campaign in that district, logged a Traverse oil pay in the Jeran et al, SE SE SE 2-2n-15w, Clyde Township, which showed 1,000 ft. of free oil in hole the first hour. Traverse lime was logged at 1,276 ft. and pay was drilled between 1,281-82 ft., present total depth. The well flowed 15 bbl. of oil through 5-in. casing and went dead. About 15 ft. of cavings were found in the bottom of the hole, which were cleaned out, and tubing was run. Well was being swab-tested through the tubing.

Ohio's future exploratory program in the Allegan project called for eight more tests when this oil pay was tapped. Most of the surrounding lands, under lease to Ohio, are owned in fee by the U. S. Government.

MICHIGAN WILDCAT FAILURES

Allegan County, Lee Township: Ford Oil Co. 1 Cappeta, SE SW SW 19-1n-15w, Traverse 1,166 ft., dry, TD 1,171 ft.

Bay County, Pinconning Township: Superior Oil Co. 1 Basel, Sr., SW NW NE 30-17n-4e, Dundee 2,912 ft., dry, TD 3,060 ft.

Kent County, Algoma Township: Phinney Brothers 1 Spriggs, NW SW NW 21-9n-11w, Traverse 2,317 ft., dry, TD 2,350 ft.

Nelson Township: Smith Petroleum Co. 1 Reed, NE NW SW 12-10n-10w, Marshall 1,026 ft., dry, TD 1,048 ft.

TEXAS GULF COAST

Houston Oil et al Open New Oil-Producing Field

HOUSTON.—A new oil discovery, the Houston Oil Co. of Texas and American Republics Corp. 1 Nona Fletcher Lumber Co., has been completed, flowing 325 bbl. of 41°-gravity oil per day through 6/16-in. choke. The new pool is located in the Brown Heirs Survey, 2½ miles southeast of the Village Mills field in Hardin County. Drilled to a total depth of 7,495 ft., production is through perforations at 7,058-66 ft.

A new sand producer, L. M. Josey et al 11 Joseph Mitchell Estate, in Liberty County, has been completed flowing 216 bbl. of 38°-gravity oil per day through 9/64-in. choke, with flowing pressure on the tubing pressure at 1,275 psi. Drilled to a total depth of 6,800 ft., production is through perforations at 6,366-438 ft.

C. N. Housh 1 James E. Wheat et al, a new producer in Tyler County, has been completed. The well flowed 102 bbl. of 56°-gravity oil per day through 3/16-in. choke, through perforations at 6,640-46 ft.

Sinclair Prairie Oil Co. 1 W. A. Schweke, Tract "A," has completed a discovery oil well in the New Ulm field in Austin County, flowing 201 bbl. of 56.7°-gravity oil per day through ¼-in. choke. Drilled to a total depth of 10,013 ft., production is through perforations at 9,225-35 ft., with tubing pressure at 2,456 psi.

Humble Oil & Refining Co. 12 M. E. Mayes has been completed a gas-condensate well, extending the East Mayes field 1 mile southeast, in Chambers County. Drilled to a total depth of 9,500 ft., the well is producing 4.9 bbl. of 60.8°-gravity condensate per hour through 10/64-in. choke, through perforations at 8,794-800 ft.

The 38 new locations for Districts 2 and 3 included 17 wildcat starts, 1 each in Brazoria, Fort Bend, Grimes, Jefferson, Tyler, Jackson, Wilson and 2 each in Liberty, Matagorda, and Victoria counties. Eight successful exploratory wells were completed, one each in Lavaca, Austin, Brazoria, Liberty, Newton, Tyler counties, and two in Refugio County, while nine wildcats were dry, one each in Brazoria, Fayette, Matagorda, Waller, Wharton, and Jackson counties, and two in Victoria County.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Austin County: New gas-condensate discovery, in New Ulm—Sinclair Prairie Oil Co. 1 W. A. Schweke, Tract "A," J. Tylee Sur., A-304, 2 miles southeast of New Ulm, TD 10,013 ft., IP: 201 bbl. oil per day open flow, top sand 9,225 ft., perf. 9,225-35 ft.

Brazoria County: New oil pay, at West Columbia—Hogg Oil Co. 10-A Mike Hogg et al, M. Varner Sur., top sand 6,026-55 ft., IP: 247 bbl. oil per day on pump, TD 7,106 ft., perf. 6,026-48 ft., 33.7° gravity, no water.

Lavaca County: Gas discovery, Hassie Hunt Trust Est. 1 R. L. Smothers, J. Chesler Sur. A-113, 3 miles south of Speaks field, IP: 14,000 M.c.f. per day on open flow, TD 9,330 ft., perf. 3,348-60 ft., shut-in pressure 1,500 psi.

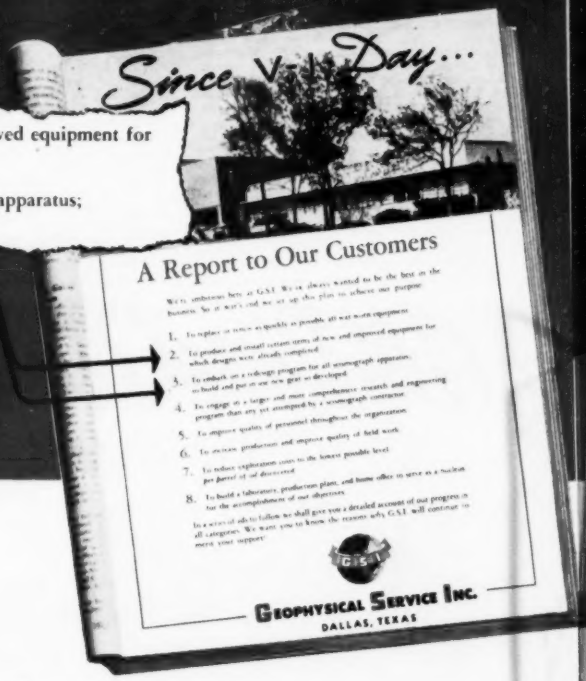
Liberty County: New oil sand, at So. Liberty—L. M. Josey et al 11 Joseph Mitchell Est., M. G. White Sur., top sand 6,364 ft., TD 6,800 ft., IP: 216 bbl. oil per day through 9/64-in. choke, perf. 6,366-438 ft., GOR 1,069, TP 1,275 psi., 38° gravity.

Newton County: New gas-condensate discovery, at So. Gist—Houston Oil Co. of Texas A-1 Newton County Lumber Co., J. Collier Sur., A-55, IP: 20 bbl. oil per day through ¼-in. choke, perf. 7,326-32

Reports Nos. 2 and 3

2. To produce and install certain items of new and improved equipment for which designs were already completed.

3. To embark on a redesign program for all seismograph apparatus; to build and put in use new gear so developed.



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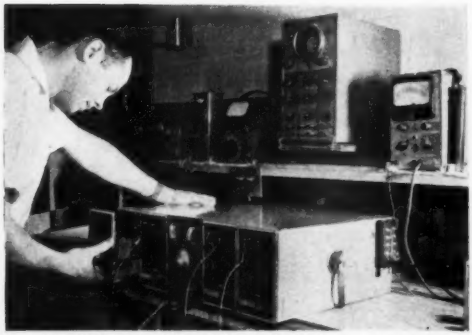


TESTING Amplifier Channels before Installation

WE'VE TOLD YOU of our 8 point plan to be the best in the seismic business. A report on the first point has already been made. Now, we're covering points 2 and 3.

75% of our seismometers have been replaced by redesigned light weight units. Field experience has proved them superior on land, marsh and water crews.

50% of GSI cameras have been replaced by new models, weighing only one-fourth as much as earlier designs.

100% replacement of filter systems in areas where these redesigned instruments are more effective.

80% of our crews are using redesigned amplifier channels.

GSI drilling machines, shooting and water truck bodies have also been reengineered. A few are already in the field. More are in production.

GEOPHYSICAL SERVICE INC.

DALLAS, TEXAS

ft., top sand 7,326 ft., TD 6,650 ft., shut-in pressure 2,765 ft.

Refugio County: New gas discovery—Hewitt & Dougherty A-42 K. D. Roche, at Roche, D. J. Mitchell Sur., A-215. IP: 6,000 M.c.f. on open flow, TD 6,065 ft., perf. 6,132-40 ft., shut-in pressure 2,500 psi.

New gas discovery—Hewitt & Dougherty D-2 F. B. Rooke & Sons, at Rooke, J. M. Aldrete Grant, 9 miles south of Woodsboro, IP: 2,200 M.c.f., on open flow, TD 7,417 ft., perf. 6,339-47 ft., shut-in pressure 2,500 psi.

Tyler County: New Oil pay, C. N. Housh 1 J. E. Wheat et al, at North Skillern, BBB&C Sur., A-113, 12 miles southeast of Woodville, IP: 102 bbl. oil per day through 3/16-in. choke, GOR 8,240, TP 1,800 psi., 36° gravity, perf 7,460-46 ft.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Brazoria County: Phillips Petroleum Co. 1 Griffith Est., H. P. Cayce Sur., south of Alta Loma, dry, TD 11,216 ft.

Fayette County: J. F. Burdette 1 W. Hermes, J. Moore ½ League, A-71, just north of LaGrange townsite, dry, TD 4,118 ft.

Jackson County: Lewis Oil Co. et al 2 Mrs. Regina Gayle, in Nestor Clay Sur., A-13, 3 miles southwest of Ganado, dry, TD 5,892 ft.

Jefferson County: Fullerton Oil Co. 1 B. E. Quinn, S. Corzine Sur., A-14, ½ mile north of Lovell Lake production, dry, TD 7,570 ft.

Matagorda County: Stanolind Oil & Gas Co. 1 Fred S. Robbins, A. Sheppard, C. H. Danderver Sur., dry, TD 6,215 ft.

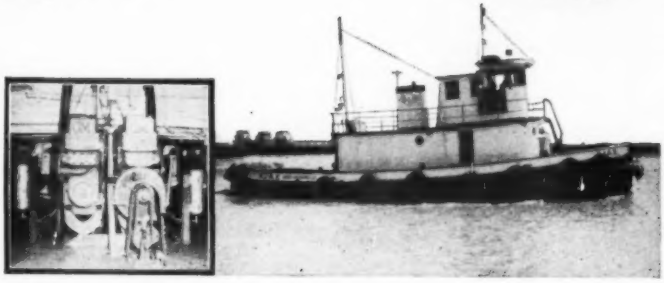
Victoria County: E. I. DuPont de Nemours & Co. 1 DuPont fee, Desidero Garcia Sur., A-38, 5 miles northwest of Bloomington, dry, TD 4,880 ft.

Gravis & Michell 1 J. J. Schmidt, in Felix de Leon Gr., A-66, 9 miles northwest of Victoria, dry, TD 4,146 ft.

Waller County: The Texas Co. 1 Walter D. Caldwell in D. Mauser Sur., 5 miles northwest of Hempstead, dry, TD 11,116 ft.

Wharton County: Lloyd H. Smith 1 F. Beal, in ETRR Sec. 81, 2 miles north of Danevang townsite, dry, TD 7,765 ft.

GM Diesel Powered



Pictured above is the AJAX, small as tugs go, yet capable of delivering better than 300 usable horsepower to a 52" diameter by 46" propeller at around 350 turns per minute. That's a lot of power for a fifty-five footer, but thanks to modern engine design and a twin 71 G.M. Diesel, furnished by GEORGE ENGINE COMPANY of New Orleans, it has been accomplished. Such a power plant easily delivers a speed of 11 miles per hour, running light, according to her owners, Guidry and Savoie of Cut Off, Louisiana. Captain Richoux believes that the AJAX has the power to tow three 6 or 7 thousand barrel barges in the Intracoastal Canal. The tug has quick acceleration and spins on a dime with very little heel.

With such a power plant as in the AJAX, repairs are cut to a minimum; there's an economy of operation heretofore unachieved. When repairs do become necessary, a complete overhaul can be made in a minimum of time. Efficient maintenance, together with complete parts service, is supplied thru George Engine and its Dealers and Branches on a "Round the Clock" basis.

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CALIFORNIA

Cuyama Valley Area Marks First Year

LOS ANGELES.—This week marks the first anniversary of the discovery of Cuyama. Eighteen months ago oil companies were not willing to touch this area, but today, with two definite fields brought in (Russell Ranch and South Cuyama), five companies have large production and several others are actively engaged in further exploration.

There are now 87 producing wells in Russell Ranch field with 17 more in various stages of completion. An attempt to extend production about 4½ miles west of the field is being made by W. R. Gerard at his 46 Gerard-Calloway, 16-10n-28w. Four other ventures in this area were unproductive. A north extension test, Richfield's 2 Harrington U. S., 14-11n-28w, has been standing since May 14, at 2,265 ft. Another well north of the field is R. B. Watkins 14-13 Wood-Callahan, which has been idle since May 14 when it was reported ready to be abandoned. Location is in Section 13-11n-28w.

Southern California Petroleum brought in the first gas well in the area, at the northern end of Russell Ranch. The well, 2 Joice, 24-11n-28w, recovered salt water from 3,823-91 ft., and was plugged back to 3,775 ft. Perforations from 2,637-2,708 ft. gave a flow of wet gas estimated at 3,000,000 to 5,000,000 cu. ft. per day. The gas zone is above the oil producing sand found in wells only 500 ft. south of this location, but is considered equivalent to the Dibblee formation.

Activity in South Cuyama field still centers close to Richfield's Homan discovery well. Early this month, Richfield completed the 87-26 Machader, ¼ mile north of the discovery, in 26-10n-27w, with an initial flow of 3,553 bbl. of 34°-gravity oil per day. And the company's 11-36 Hibberd came in at 1,257 bbl. daily. Production in both wells is from the Dibblee sand and is now beaned back to 500 bbl. per day.

Also in South Cuyama, Richfield is currently drilling the 21-36 Hibberd and the 88-26 Machader. There are four additional locations under way, one each on the company's Hibberd, Homan, Machader, and Perkins leases. A test on the Perkins property, about 5 miles east of the discovery, is currently at 11,833 ft. Preparations are being made to test for production after plugging to 11,620 ft.

Bolsa Chica Oil Corp. has spudded in a test in the extreme southeastern part of Cuyama Valley, the 1 Hickey, in the northeast quarter of 30-9n-24w, about 14 miles southeast of the Homan well. The closest well to this site is Humble Oil & Refining Co.'s dry 1 Wegis, about 4 miles to the west.

Gene Reid Exploration, Independent Exploration Co., and Universal Consolidated Oil will drill their first exploratory well on the Carrizo Plains, Kern County. The test will be the 67 Temblor-Roxroth in Section 36-28s-18e. The companies have more than 50,000 acres under lease in this area.

Wildcats have been started in two areas that have been considered as promising but have never yielded commercial production. One site is Santa Rose Island where J. R. Pemberton has started his 2 Tecolote, 12-3n-32w. The other location is Elkhorn Valley, San Luis Obispo County, where the 2 Melinda, southeast corner of 22-32s-22e, is now at 175 ft.

CALIFORNIA WILDCAT FAILURES

Colusa County, Arbuckle area: Standard Oil Co. 1 Elsey estate, 31-14n-1w, dry, TD 3,850 ft., elev. 56 ft.

Fresno County, Cantua Creek area: Wilshire Oil Co. 22 Cantua, 10-17s-15e, dry, TD 6,894 ft., elev. 378 ft. (also known as Turk Anticline area).

Kern County, Williams area: Continental Oil Co. 1 Continental-Texas, 8-28s-20e, dry, TD 5,124 ft., gray sand-Button Bed 3,061 ft., Media 3,320 ft., Aqua 3,814 ft., Phacoides 4,432 ft., Oceanic missing, first Point of Rocks 4,868 ft., main Point of Rocks 5,107 ft., elev. 850 ft.

Comanche Point area: Henry Lubking & Assoc. 2 Tejon, 36-32s-29e, dry, TD 1,120 ft., elev. 755 ft.

Tejon area: Von Glahn Oil Co. 1 Tejon, 32-12n-18w, Santa Margarita 1,350 ft., dry, TD 1,485 ft., elev. 735 ft.

Orange County, Brea area: Pacific Western Oil Corp. 2-1 Brea Comm., 11-3s-10w, dry, TD 8,520 ft., elev. unknown.

CANADIAN FIELDS

Alberta Has Three New Natural Gas Discoveries

CALGARY.—During the past week Alberta's oil industry has chalked up three more natural gas discoveries on the central plains of the province. Two had previously yielded gas from the higher Viking sand formation and added lower Cretaceous gas to their potentials, while the third received its first gas in the lower Cretaceous. Primary objective for the three exploratory wells is crude oil—lower horizons are now being probed in search of this goal.

Ninety miles northeast of Calgary and 8 miles north of the town of Craigmyle, Socony-Vacuum Exploration Co., in its search for Madison limestone oil, yielded a gas discovery in the basal lower Cretaceous. Results of drill-stem test in this formation showed a gas flow in excess of 5,000,000 cu. ft. daily plus a pipe recovery of 2 gal. of distillate indicating wet gas. The well has now contacted its main objective, the Madison limestone, set casing near top of lime at 4,029 ft. and will commence test program during the next few days. What the wildcat, 2 Socony-Craigmyle, will yield from the Madison should be determined within the coming week.

Around 35 miles northeast of Craigmyle and 120 miles northeast of Calgary, A. G. Bailey Co. of Calgary and associates struck natural gas in the Viking sand and lower Cretaceous horizons. The Viking gas came around 3,195 ft. with a flow of around 4,000,000 cu. ft. daily; while the lower Cretaceous yield was about 100 ft. lower and rated a much larger potential of 20,000,000 cu. ft. daily. No oil or water showed on either tests. The well, 1 Bailey-Castor, is continuing to core through the Cretaceous at 3,620 ft. heading for the Devonian.

Fifty-five miles north of the Castor dual formation strike and 150 miles northeast of Calgary, another twofold gas discovery was made at 1 Jarrow wildcat. After recording gas in the Viking and lower Cretaceous, crew set a protective string of casing through the productive zones to bottom, preliminary to continuing in search of its main objective, the Devonian. Gas flowed from the Viking section around 2,150 ft. at a daily rate of 5,000,000 cu. ft.; from the lower Cretaceous section around 2,530 ft., at a daily rate of 350,000 cu. ft. Interest in this well is divided between the Alberta Exploration Syndicate, Tower Petroleums Limited, Anglo Canadian Oil Co., Husky Oil & Refining, Ltd., and Phillips Petroleum Co.

Calmont Oils, Ltd., and its subsidiary, Calnorth Oils, Ltd., have obtained oil success at their 4 Calmont-Calnorth in the southeast sector of the Leduc field. This is the fourth joint venture by the two Calgary independents, and is located on an Imperial Oil, Ltd., farmout site in LSD 4, 2-50-26w4. During first flow tests the well commenced making oil at rates between 8 and 10 bbl. hourly.

CANADIAN WILDCAT FAILURES

Alminster 1, LSD 14, 35-41-4w4, TD 2,350 ft.

Sun-Pipestone Creek Province 1, LSD 5, 11-47-24w, TD 6,257 ft.

APPALACHIAN FIELD

Preston County Test Logs Gas Shows

PITTSBURGH.—In Portland district, Preston County, West Virginia, Hope Natural Gas Co.'s deep test, the 2-9331 J. Paul Martin, elevation 1,898 ft., logged the Oriskany sand at 5,172 ft. with gas at 5,179 ft. and 5,195 ft., testing 500,000 cu. ft. Drilling is continuing at 5,222 ft. In Glade district, Webster County, this company's 9227 West Virginia & Pittsburgh Railroad Co., elevation 2,512 ft., which encountered a fishing job at 6,435 ft., is drilling again at 6,564 ft. Two good shallow sand gas wells were noted: in Collins Settlement district, Lewis County, L. D. Nutter 1 M. B. Brooks et al gaged 1,302,000 cu. ft. in the fifth sand, total depth 2,276 ft.; in Harts Creek district, Lincoln County, United Fuel Gas Co. 2-6535 J. B. Lambert had 1,896,000 cu. ft. in the Big lime, Big Injun, and shale, total depth 3,425 ft.

In Unity Township, Westmoreland County, Pennsylvania, Peoples Natural Gas Co. 1-3830 W. Piper, elevation 2,061 ft., drilled through the Oriskany sand at 8,301-60 ft. with no shows of gas and is continuing at 8,371 ft. Operations at this company's 4-3814 Camilla Giffin, in Derry Township, are still shut down.

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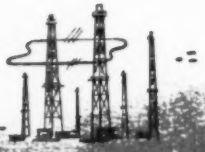

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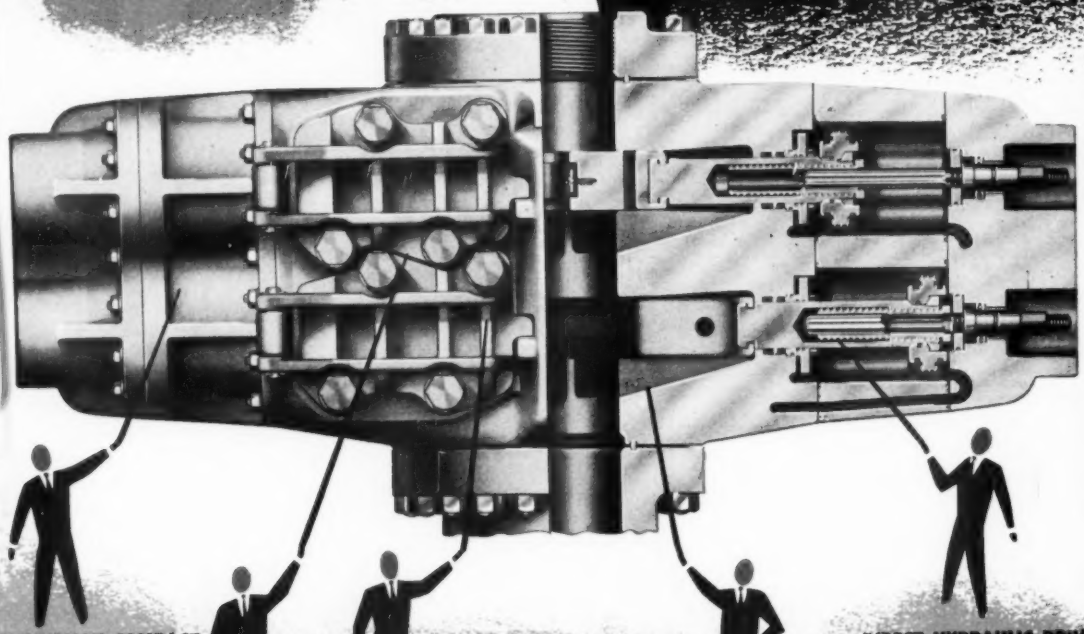


UNUSUALLY COMPACT
A Double Gate measuring less than 30" in overall height, even in sizes as large as 13" . . . smaller sizes proportionately less!

TWO GATES IN ONE
Two separate ram compartments unitized into one compact body—actually two Hydraulic Gates in one!

FAST RAM CHANGES
Simply unbolt door on side of Gate, slide old ram out, change ram, slide ram back in, bolt door shut. It's as simple and fast as that . . . and complete ram changes can be made whether pipe is in or out of the hole!

QUICK-DRAINING BODY
Rams travel on narrow guide ribs high above a steeply-sloped self-draining ram compartment bottom. No detrimental sand or mud accumulation!

DIRECT HYDRAULIC DRIVE
Fluid Power—Direct Action—Positive Operation! All moving parts protected within the body.

control gate advancement in a decade!

AFTER A LONG PERIOD of engineering development and testing, Shaffer proudly announces its new Shaffer Hydraulic Cellar Control Gate—*two* separate ram compartments unitized into *one* body *with an overall height of less than 30" even in sizes as large as 13⅜"*—as well as space savings in both length and width!

That's *real* compactness—that saves valuable cellar space on every rig where it's installed—that permits more compact hook-ups, more space in the cellar for other equipment, plus vital space savings in storage and shipping.

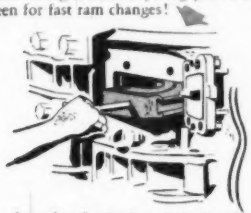
Note in the accompanying table the amazingly small overall height of the new Shaffer Hydraulic Gate in the various sizes. Then remember—this small height includes *two* separate ram compartments in the *one* body—in reality two hydraulic gates in one.

SHAFFER HYDRAULIC GATE DIMENSIONS

Gate Size	7"		9"		11"		13"	
Test Pressure (PSI)	6,000	10,000	6,000	10,000	6,000	10,000	6,000	10,000
Bore	7 1/16"		9"		11"		13 5/8"	
A—Height . . . inches	25	26 1/2	25 1/4	27 1/2	27 1/2	30 1/2	30	36 1/4
B—Width . . . . inches	28 5/8	31 1/2	31 5/8	35 1/4	34 1/4	37 5/8	40	40 1/2
C—Length . . . inches	70 3/4	70 3/4	71	72	79	81 1/4	88 1/2	88 1/2

New Simplicity In Changing Rams

Best of all, unusual compactness is only *one* of *many* new features in the Shaffer Hydraulic Cellar Control Gate. It's the simplest Gate you ever saw when it comes to changing rams. Each ram assembly is readily accessible through a quick-opening side door hinged to the Gate body. By simply unbolting the door and swinging it open, the ram assembly can be pulled right out. Change the ram assembly, slide it back in—then close and bolt the door. It's so simple, so quick, so time-saving it beats anything you've ever seen for fast ram changes!



Completely Enclosed Hydraulic Operation

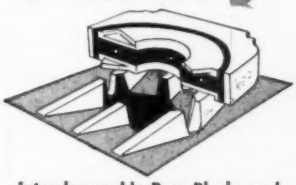
Here's something else—all moving parts in the hydraulic cylinder, including piston rod ram shafts, are completely enclosed. There are no moving parts projecting from the Gate—nothing to become damaged or wedged by loose pipes or timbers in the cellar—nothing to become corroded by salt fluids or chemical muds dripping down into the cellar. Even the locking shaft is completely enclosed and stays enclosed in all positions because it is non-rising.

Corrosion-Free Hydraulic Cylinders

All operating parts in the hydraulic cylinders are of either stainless steel or manganese bronze. Therefore, although hydraulic oil is recommended as the operating fluid, water can be used without risk of corrosion, rust or damage to parts.

Self-Draining Ram Compartments

Another important point—note how the rams travel on high narrow guide ribs raised above the steeply sloped bottoms of the ram compartments. No detrimental sand and mud accumulations can interfere with the operation of the rams because mud and sand drains right back into the well from the Gate body. Any that does remain is far below the ram operating level and does not interfere with free ram travel—therefore cannot keep the rams from closing and sealing.



Interchangeable Ram Blocks and Rubbers

Shaffer Hydraulic Cellar Control Gates have still another advantage—they use the same ram rubbers and ram blocks, size for size, that have proven so dependable in mechanically-operated Shaffer Cellar Control Gates. Where both types of Shaffer Gates are used in a field, ram rubbers and ram blocks can be used interchangeably, reducing inventories and simplifying maintenance!

GET THE FULL STORY of this great new Shaffer advancement. There are many other features you should know about. Write for complete details!

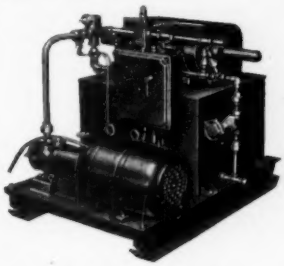
Send for your copy of the complete Shaffer catalog.

Compact Power Closing Units

Because of its lower overall cost, its savings in maintenance and its low freezing point, it is recommended that hydraulic oil in a closed system be used to operate Shaffer Hydraulic Gates. Two types of power closing units are available for supplying the necessary pressure—one operated by electricity, the other by air, gas, steam or water pressure—thus providing a type of power to meet every rig requirement.

Both types have high volume pumps which assure closing the Gates within seconds.

In addition Shaffer Hydraulic Gates can also be opened and closed mechanically, assuring full protection in case of power failures.



Centralized Control Panel

Complete control of the power closing unit, as well as of the opening and closing of the rams in both compartments of the Gate, is centralized in a compact unitized control panel that can be placed alongside of the driller or at any other convenient location.

Three manually-operated 4-way hydraulic valves are built into the panel—two of the hydraulic valves control the opening and closing of the rams—one for each compartment of the Double Gate—and the third valve can be used to control other hydraulic equipment or to operate another Gate.

These valves can also be operated by remote control, permitting auxiliary control stations to be installed at a distance from the rig if desired—an important safety feature.

The entire control panel is unitized and can be moved from rig to rig with minimum installation and break-out time.

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SOUTH LOUISIANA

Oil Production Confirmed In Gas-Condensate Field

NEW ORLEANS.—Humble Oil & Refining Co. B-1 R. H. Goodrich, in the Duck Lake field, St. Martin Parish, 2-15s-11e, has been completed and is flowing 421 bbl. of 33°-gravity oil per day through ¼-in. choke, confirming oil production in that area. Drilled to a total depth of 11,747 ft., production is through perforations at 11,470-75 ft.

A new gas producer, Union Producing Co. B-1 LaTerre-State Unit, has been completed in the Bay Baptiste area of Terrebonne Parish, Section 45-19s-19e. The hole was drilled to 9,045 ft., and completion was made through perforations at 8,984-94 ft., flowing 4,703 M.c.f. of gas through ¼-in. choke, with flowing pressure on the tubing at 3,550 psi. The well is shut in.

The 10 new locations in South Louisiana included four wildcat starts, one each in Allen, Plaquemines, Pointe Coupee, and Vermilion parishes. There was one successful exploratory well completed, while four wildcats were dry, one each in Acadia, Calcasieu, Jeff Javis, and Vernon parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Pointe Coupee Parish: New oil sand—The Texas Co. 2 J. O. Long et al, at Fordoche, 29-6s-8e, top sand 8,197 ft., TD 10,000 ft.; IP: 310 bbl. oil per day through 10/64-in. choke, perf. 8,197-207 ft., TP 1,250 psi., GOR 643, 36.6° gravity.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: Prince Drilling Co., Mayo et al, 1 Mrs. Marie A. D. Clement et al, 45-9s-2w, approximately 1 mile north of Jennings production; dry; TD 10,122 ft.

Calcasieu Parish: Sutton Joint Account 1, La. Canal Co., 36-8s-7w, approximately 2 miles off northwest flank Iowa dome, dry; TD 4,506 ft.

Jeff Davis Parish: Bateman Drilling Co. 1 Whitney Langle, 27-7s-5w, dry; TD 8,525 ft.

Vernon Parish: Magnolia Petroleum Co. 1 Louisiana Long Leaf Lumber Co., 15-4n-9w, 6 miles northeast of Orange townsite; dry; TD 12,431 ft.

ROCKY MOUNTAIN

Ohio Oil Makes Discovery In Gurley, Neb., Area

DENVER.—A new discovery in western Nebraska is indicated by tests made during the week at Ohio Oil Co. 1 M. E. Egging, NE NE NE 11-15n-49w, in the Gurley area, 10 miles northeast of the town of Sidney, in Cheyenne County. The well was drilled to 4,429 ft., total depth, with Muddy reportedly topped at 4,401 ft. Cores in the sand showed saturation, but two drill-stem tests of the zone reportedly failed. Casing (9⅝-in.) was cemented at 4,403 ft. and the operator started swabbing. The well made approximately 8 bbl. of fluid hourly, 50 per cent fresh water, the first day, and on the second day the water was gone, pressures increased, and the operator swabbed approximately 15 bbl. of 33°-gravity, light, green, paraffin-base oil per hour. The well was shut in after swabbing 3 days and pumping equipment will be installed.

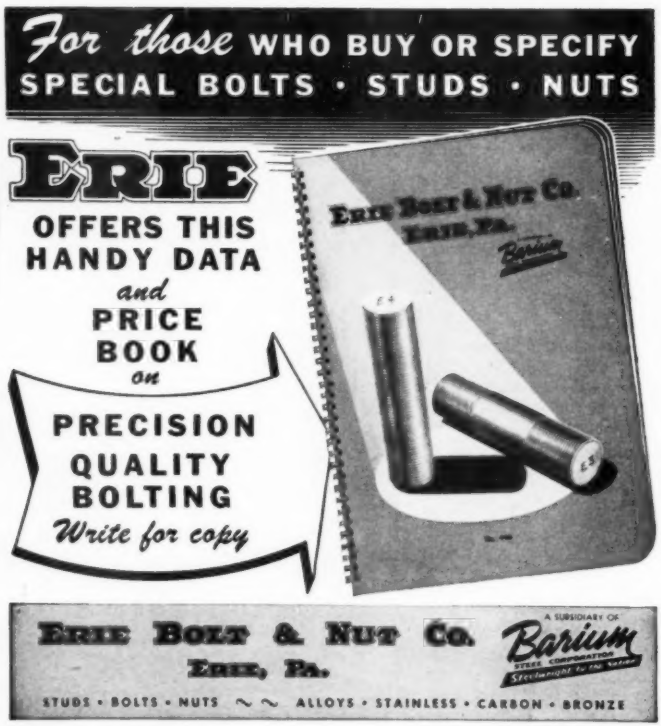
Ohio has a block of approximately 170,000 acres through Central Cheyenne County, and recovery of oil at this wildcat immediately started a leasing play throughout southwestern Nebraska and northeastern Colorado, in which several major operators joined. Ohio did seismic work throughout the northeastern side of the Denver Basin for 3 years prior to starting the wildcat, and reportedly has several seismic highs in the general area. Carter Oil Co., The Texas Co., Lion Oil Co., Shell Oil Co., and others also have blocks on gravity, seismic, or surface highs. Pending further development drilling in the area, it is difficult to determine whether production at Gurley may be due to structural or stratigraphic conditions. The Muddy sand is considered eratic in parts of the Denver Basin. On the west side of the basin saturation was found in the Muddy at The California Co. 1 Morton-King, SE¼ NW SW 13-13n-68w, Laramie County, Wyoming, with Muddy topped at 8,498 ft. The well was deepened to Cambrian at 11,374 ft., and the operator is now testing Muddy after plugging back. This well offset to the southwest one drilled several years ago by Amerada Petroleum Corp. et al, and this well found only a small section of Muddy sand with staining, indicating that the sand may be lenticular. Ohio has released little information concerning its Gurley wildcat, but widespread leasing may indicate that geologists of the region believe the production to be due to stratigraphic accumulation. Tests will continue on the wildcat, the first to find production in this area of Nebraska and the Denver basin.

Additional saturation was cored by Carter Oil Co. and Stanolind Oil & Gas Co. at 1 Ute Tribal, C NW SW 21-1s-1e, in the Roosevelt area, Uintah County, Utah. The well has been drilled to 9,392 ft., total depth, 16 ft. lower than the zone drill-stem tested last week. On the new test between 9,357-92 ft. oil flowed in 131 minutes and continued at a good rate throughout the 6-hour period. No gages were announced by the operator. The oil is 26°-gravity brown, paraffin base, and reportedly congeals at high temperatures. Production is from a fractured zone in the basal Tertiary, and cores of the zone have shown low porosity and permeability. Production estimates of the test made last week, between 9,353-76 ft., were as high as 100 bbl. of oil per hour. This wildcat is located west of Carter's Vernal Unit, where the company has drilled four deep Tertiary dry holes in the past 2 years. The well is reportedly located on a seismic high in the area, following extensive shooting by these companies and others throughout the Uinta Basin of Utah. The operator is now running casing on the wildcat prior to planning completion of the well.

A disappointment was had by Pure Oil Co. in its third well at West Poison Spider, Natrona County, Wyoming. The well, located 1 mile west of the company's Frontier formation discovery, is now reported below 9,450 ft., and there was no recovery on two drill-stem tests of a zone in the Mesa Verde, productive in the second well. Pure made a new pay discovery last winter in its second well on the structure, and also made the first commercial Mesa Verde discovery in the region. Although some staining was logged in sands at around 9,200 ft., apparently the zone will not be commercial.

New locations.—There were 13 new locations, with 7 in Wyoming, 4 in Montana and 2 in Colorado. In Wyoming the majority of locations were for pool or extension wells in the Mush Creek-Skull Creek area, Weston County. In Colorado location was reported for Stanolind Oil & Gas Co.'s Ignacio wildcat, at 1 Martinez, C NW NE 18-33n-7e, LaPlata County. The wildcat is scheduled to go below Pictured Cliffs at 6,500 ft., and will be an important well for the San Juan Basin. Montana locations were for pool wells.

Completions.—Thirty-nine wells were completed with a total daily initial of 2,362 bbl. of oil. Included in the five wildcats completed in Wyoming, was a 2-mile southeast extension to the Skull Creek field, Weston County. The well made 32 bbl. of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oil per day from Newcastle between 2,934-40 ft. Husky Refining Co. and Ohio Oil Co. plugged their Lox-Arminto wildcat, Natrona County, after finding steep dips in Frontier sands.

WYOMING SUCCESSFUL WILDCAT

Weston County, SE Skull Creek: Parker & Simmons 1 Government-Wright, SW NE SW 24-44n-62w, 2,940 ft. TD, pumped 32 bbl. oil per day, Newcastle 2,934 ft.

WYOMING WILDCAT FAILURES

Crook County, Lightning Flat: Amerada Petroleum Corp. 2 A. M. Starr, C SW SE 27-58n-68w, 3,995 ft., TD, PB 3,528 ft., abnd., Nobrara 1,786 ft., Beaver Creek 1,622 ft., Frontier 2,296 ft., Newcastle 3,510 ft., Dakota 3,756 ft., Fuson 3,876 ft., Lakota 3,914 ft., Morrison 3,957 ft.

Natrona County, Iba Structure: Powers Oil & Drilling 1 Young, C SE SE 25-32n-82w, 1,775 ft. TD, abnd., first Frontier 1,265 ft., second Frontier 1,455 ft., third Frontier 1,565 ft., fourth Frontier 1,735 ft., shaled out.

Lox-Arminto: Husky Refining and Ohio Oil 1 Arminto, SW NE NE 19-37n-86w, 3,533 ft. TD, abnd., Nobrara chalk 1,243 ft., Carlisle 1,365 ft., first Frontier 1,695-1,818 ft., second Frontier 2,454-86 ft., third Frontier 2,836-3,160 ft., Mowry shale 3,350 ft.

Weston County, West Alkali Creek: Haynes Servicing Co. 1 Finn, SW SW SW 4-42-64w, 6,228 ft. TD, abnd., Niobrara 4,293 ft., Wall Creek 4,854 ft., Greenhorn 4,974 ft., Newcastle 5,835 ft., Dakota 6,042 ft., Lakota 6,120 ft., Morrison 6,155 ft.

COLORADO WILDCAT FAILURE

Adams County, Marshall area: C. J. Marshall 1 Maul, C SE SE 14-2s-67w, 2,024 ft. TD, abnd.

MONTANA WILDCAT FAILURE

Pondera County, Concord Midway: Pilot Production 1 McFarland, NW NW NW 18-29n-3w, 2,785 ft. TD, PB 2,770 ft., abnd., Ellis-Madison 2,617 ft., dry.

ARIZONA WILDCAT FAILURE

Navajo County, Snowflake area: L. M. Lockhart 1 Aztec Land & Cattle Co., 33-14n-20e, dry, TD 3,734 ft.

KANSAS

Wildcat in Pawnee County Finds Arbuckle Production

SUNRAY OIL CORP. has a prospective new pool opener in Pawnee County where its 1 Brown, NE NE SW 28-21-16, encountered good showings in the Arbuckle, topped at 3,853 ft. (—1,828 ft.). A 30-minute drill-stem test at 3,873½ ft. resulted in a gas flow estimated at 3,000,000 cu. ft. per day and a recovery of 100 ft. of oil and 50 ft. of oil-cut mud. With hole deepened to 3,881½ ft., a second 30-minute drill-stem test, taking in a zone at 3,876 ft. to bottom, resulted in a gas flow estimated at 2,000,000 cu. ft. per day and a recovery of 120 ft. of oil, 120 ft. of muddy oil and 30 ft. of water. Bottom-hole pressure was 1,750 psi. and gravity of the oil 46.6° A.P.I. A string of 5½-in. casing has been cemented on bottom for completion. Nearest production is the Southwest Ash Creek pool, 5½ miles northeast.

A new gas pool has been opened in Cowley County by Wakefield & Bridgeport in their 1-A Roberts, SE SE SE 21-31-5. With 5-in. casing perforated at 2,295-2,309 ft. in the Layton sand, the well flowed an estimated 2,500,000 cu. ft. of gas per day and has been shut in. Layton was topped at 2,290 ft. (—976 ft.) Hole was drilled to 3,556 ft. in the Arbuckle, topped at 3,546 ft. With the latter horizon unproductive, casing was run to 2,400 ft. and hole plugged to 2,337 ft.

Development in the Berland area in southwestern Rooks County continues to spread. Latest extension is at Sunray Oil Corp. and Heathman-Honaker Drilling Co. 1 Richardson, NW NW NW 17-10-19, ¾ mile west of nearest production. On swabbing tests, it made 3 to 4 bbl. of clean oil per hour from the Arbuckle at 3,767-72 ft. Discovered less than a year ago, the pool now has 18 producing wells. Recent extensions to the north have inspired intensified drilling activity with nine operations now under way.

KANSAS SUCCESSFUL WILDCATS

Cowley County: Wakefield et al 1 Roberts "A," SE SE SE 21-31s-5e, 1,500,000 cu. ft. of gas per day from Layton, TD 3,556 ft.

Ellis County: Westgate-Greenland 1 Windholtz, SW SW SW 3-12s-17w, 58 bbl. of oil per day from Lansing, TD 3,596 ft.

Waubansee County: Carter Oil Co. 1 Davis, SW SE SW 33-13s-10e, 3,580 bbl. of oil per day from Viola, TD 3,206 ft.

KANSAS WILDCAT FAILURES

Barton County: Mouser 1 Franson, NW SE NW 6-20s-12w, dry, TD 3,461 ft., Arbuckle 3,452 ft.

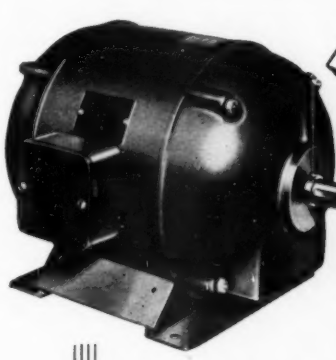
Lauck 1 Moore, SW SW NE 14-20s-13w, dry, TD 3,536 ft., Arbuckle 3,489 ft.

Nemaha County: Carter Oil Co. 1 Huftles, NW NW SW 25-3s-13e, dry, TD 2,976 ft., Simpson 2,933 ft., no Arbuckle, granite 2,972 ft.

Rooks County: Brunson 1 Wamhoff, NE NE SE 35-7s-20w, dry, TD 3,469 ft., reworked Arbuckle 3,404 ft., Arbuckle 3,415 ft.

Aylward 1 Marcotte "A," SW NE NW 18-9s-19w, dry, TD 3,575 ft., Topeka 3,046 ft., Heebner 3,253 ft., Lansing-Kansas City 3,219 ft.

Virginia Drilling Co. 1 Steeples, SW SW NW 23-9s-20w, dry, TD 3,810 ft., Arbuckle 3,754 ft.



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LA.-ARK.

Barnsdall Testing Bodcaw At Distillate Discovery

SHREVEPORT.—Barnsdall Oil Co. 1 Ardis & Co., distillate discovery in 27-22n-11w, Bossier Parish, was running further tests of the Bodcaw before making completion. At last report the well flowed 200 bbl of distillate a day, with 1,112,000 cu. ft. of gas on 16/64-in. tubing choke, from perforations at 9,156-86 ft.

Claiborne Parish.—Hunt Oil Co. 1 J. H. Owens, NE NE 19-23n-6w, was drilling below 10,203 ft. Three miles southwest of the Sugar Creek field, C. R. Schuster 1 Dance, 20-19n-6w, had total depth at 7,600 ft., thought to be the Travis Peak, and set plug at 6,300 ft. to test the Rodessa.

Natchitoches Parish.—Continental Oil Co. 1 Bastrop State Bank, 18-10n-6w, was drilling below 5,269 ft. in the Paluxy. Sample tops released were: Nacatoch sand 2,780 ft., Saratoga 2,880 ft., base annona 3,190 ft., and top of the Ozan 3,300 ft. Elevation is 166 ft.

Union Parish.—Carter Oil Co. 1 G. S. Hicks, SE NW 22-21n-3w, was drilling below 7,480 ft., with no shows reported. Base of the massive anhydrite was placed at 3,800 ft., by samples. Elevation is 206 ft.

Southwest Gas Producing Co. 1 Weldon, 24-21n-3w, was drilling below 7,535 ft.

In Columbia County, Arkansas, McAlester Fuel Co. 1-A T. O. Giles, 6-18s-18w, was coring at 7,819 ft. in the Smackover. A drill-stem test from 7,739-46 ft., open 2 minutes, recovered 510 ft. of fluid, being 80 per cent water cushion and the balance distillate. Cores from 7,746-7,811 ft. recovered lime with distillate odor and taste. Previously the well flowed dry gas on a drill-stem test at 7,739-46 ft.

Carter Oil Co. 1 Russell, 33-17s-16w, Union County, was mixing mud at 8,223 ft., total depth. Lion Oil Co. made location for its 1 Lofton, SW NE 34-18s-18w, 4 miles southwest of the Schuler field, which is to be a Smackover test.

NORTH LOUISIANA WILDCAT FAILURES

Franklin Parish: British American Oil Producing Co. 1 G. N. King, SW SE NE 4-13n-7e, dry, TD 6,201 ft., Wilcox 1,920 ft., Midway 3,577 ft., gas rock 4,152 ft., Tuscaloosa 4,097 ft., Paluxy 5,785 ft., elev. 78 ft.

Webster Parish: Hassie Hunt, trustee 1 M. A. Davis, 31-19n-10w, dry, TD 4,229 ft., no shows reported.

ARKANSAS WILDCAT FAILURES

Drew County: Petroleum Investment, Inc. 1 M. L. Sigman, SW NE 25-11s-8w, dry, TD 4,278 ft., Wilcox 1,864 ft., Midway 2,710 ft., Arkadelphia 3,367 ft., Nacatoch sand 3,521 ft., Saratoga 3,792 ft., Meakin 4,073 ft., Tokio 4,141 ft., Paleozoic 4,224 ft., elev. 217 ft., est.

Hempstead County: Aaron Freedman 1 H. J. and W. K. Lemley, SW NE NW 32-10s-24w, dry, TD 2,204 ft., Cotton Valley shale 1,700 ft., no sand present.

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EASTERN TEXAS

Gas-Distillate Discovery Showing in Hallsville Area

DALLAS.—Atlantic Refining Co. 1 M. P. Isom, E. A. Merchant Survey, 7 miles northwest of Hallsville in Harrison County, was showing for a gas-distillate discovery in the Rodessa. Some reports credited the well with flowing from 10,000,000 to 15,000,000 cu. ft. daily on a drill-stem test of the Young section of the Rodessa. A 50-ft. recovery in coring from 6,770-6,820 ft. was 12 ft. of hard lime with no shows, 10 ft. of porous lime with faint gas and distillate odor, and 28 ft. of hard clay and limestone. A 20-minute drill-stem test from 6,774-6,820 ft., using $^{3}/_{8}$-in. bottom and open top, plus 1,500 ft. of water cushion, flowed the water cushion in 13 minutes at a maximum surface pressure of 525 psi. Recovery was 260 ft. of heavily gas and distillate-cut mud. Hydrostatic pressure was 3,650 psi., and bottom-hole flowing pressure was 2,800 psi. Shut-in pressure was not reported. It was to drill ahead to the Pettit before making further tests.

On an elevation of 267 ft., derrick floor, base of the massive anhydrite in the 1 Isom was called at 6,430 ft. Top of porosity was 6,782 ft., by cores. According to reports, the wet gas show was about flat, correlated to similar production in the Whelan gas-distillate field, 5 miles to the north.

Humble Oil & Refining Co. 1 S. V. Guerin, James Frazier Survey, 4 miles southeast of Cusseta in Cass County, was coring ahead below 7,621 ft. in lime and sand. Cores from 7,520 ft. recovered sand, lime and siltstone, with no shows and little porosity. W. A. Peterson 1 R. C. Connor, Paluxy test on the northwest edge of Avinger, was drilling below 4,720 ft. in shale and sand.

Arkansas Fuel Oil Co. 1 K. L. Barton, Harrison Graham Survey, confirmation well for the Garrison field of Rusk County, prepared to core ahead below 7,057 ft. There were no shows in cores from 7,005-30 ft., and light stains in hard, tight lime between 7,030-55 ft. Operators reamed and drilled out to 7,057 ft., then drill-stem tested with packer at 7,048 ft. Using $^{1}/_{4}$-in. chokes and 1,000 ft. of water cushion, the well produced a slight blow through the 30-minute test, and recovered the water cushion which was slightly cut with gas, and 30 ft. of rat-hole mud slightly salty. Bottom-hole flowing pressure was 500 psi., and 950 psi. shut in.

Field reports indicated Bobby Manziel 1 Maud Thompson, S. Yarbough Survey, 2 miles north of Macks in Wood County, would rework, when fluid being pumped

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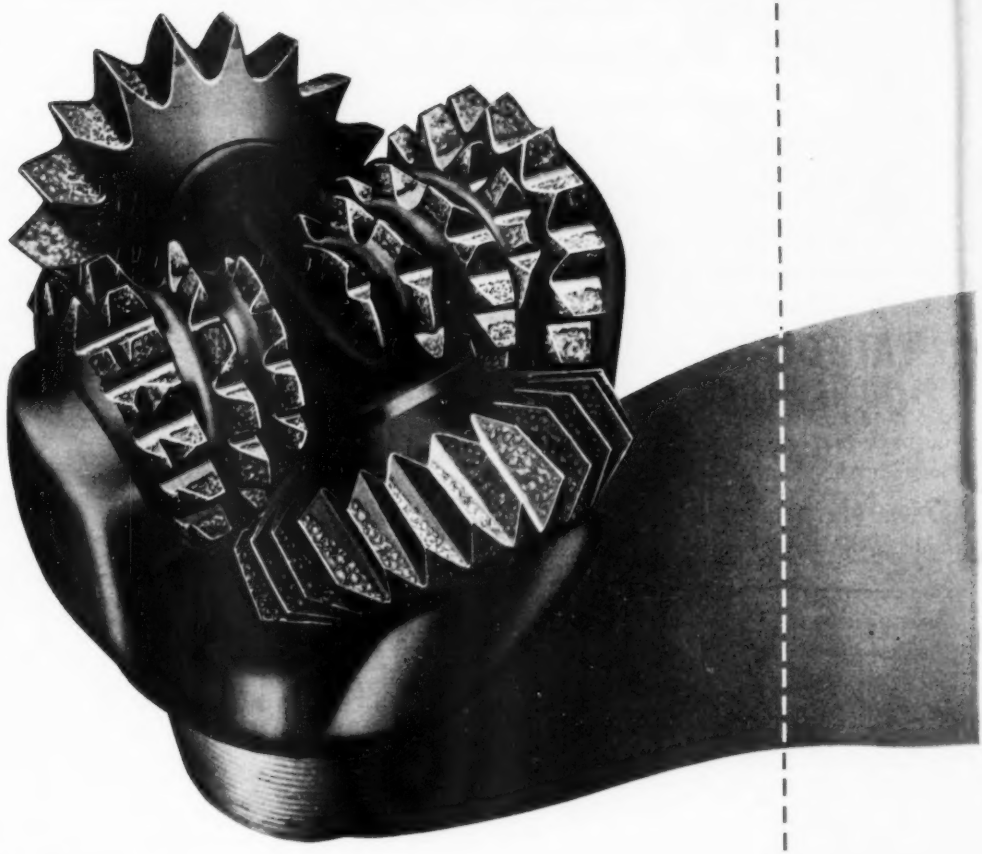

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was 100 per cent salt water. On earlier tests the well pumped from 6 to 8 bbl. of fluid an hour, being 5 per cent oil, from perforations in the sub-Clarksville at 4,690-4,724 ft. Total depth was 5,600 ft. in the Woodbine sand, topped at 5,426 ft. The well was believed to have a total of 8 ft. of oil sand in the sub-Clarksville.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) WILDCAT FAILURES

Hunt County: R. L. Peveto and B. G. Byars 1 Sealy, I. Handlin Sur., 6 mi. SE Greenville, dry, TD 4,345 ft., Eagleford 2,490 ft., Woodbine 3,002 ft., Comanche lime 3,749 ft., Paluxy 4,278 ft., sand 4,333 ft., elev. 504 ft.

Navarro County: Coats & Danciger 1 G. W. Ross estate, James McGee Sur., 3 mi. SW Richland, dry, TD 3,421 ft., Sample tops: Navarro 750 ft., Nacatoch 870 ft., Pecan 1,715 ft., Austin 2,525 ft., sub-Clarksville 3,048 ft., Eagleford 3,064 ft., Woodbine 3,117 ft., elev. 431 ft.

Shelby County: Barnsdall Oil Co. 1 West Pickering Lumber Co., B. H. Simpson Sur., 4½ mi. E Shelbyville, dry, TD 3,728 ft., Midway 1,033 ft., Nacatoch 1,884 ft., Saratoga 1,939 ft., Tokio 2,624 ft., Austin 2,917 ft., Eagleford 3,301 ft., Paluxy 3,595 ft., elev. 325 ft.

N. CENTRAL TEXAS

Kadane & Sons Prepare Completion of Discovery

WICHITA FALLS.—Operators were rigging up cable tools to drill out plug and complete at G. E. Kadane & Sons et al 1-B Laura R. Dosser heirs, prospective Ellenburger strike about 11 miles southeast of Albany and 3½ miles southwest of Ibex, between the Sedwick and Ibex areas.

A 1-hour drill-stem test from top of the Ellenburger at 4,220 ft. to 4,244 ft. had gas at the surface in 3 minutes and recovered 135 ft. of heavily oil-cut mud. The well also showed for some kind of a discovery in the conglomerate, when it made from 7,000,000 to 10,000,000 cu. ft. of wet gas with a spray of distillate on a drill-stem test at 3,904-14 ft.

Jack County.— Mid-Continent Petroleum Corp. 1 Campsey, M. W. Thomson Survey, 1½ miles southeast of Post Oak field, was bailing out before drilling plug with cable tools. Total depth was 6,359 ft. in the Ellenburger topped at 6,277 ft. A drill-stem test from 6,280-6,332 ft. showed gas. Mid-Continent 1 Boyd, S. H. Hazel Survey, about 1½ miles southeast of the 1 Campsey, was drilling below 3,097 ft. in lime.

In eastern Jack County, Glasscock and Pontiac Refining Co. 1 R. L. Morris, J. U. Fields Survey, was said to have stimulated lease buying by its 480-bbl.-per-day flow from the conglomerate at 5,404-46 ft. Same operators' 2 Morris, northwest offset, was drilling below 4,420 ft. Mid-Continent Petroleum Corp. made location for its 1 T. E. Davis, a 5,000-ft. test 1½ miles north of the Morris discovery, 1,702 ft. from north and 330 ft. from east lines of the J. J. Shelton Survey, A-596.

Derrick was up and rig was being moved in at Jack Grace et al H-1 T. H. Cherryhomes, 6,000-ft. Ellenburger test located 4,000 ft. from south and 2,000 ft. from west lines, T. Henry Survey, A-264, 2 miles east of Cundiff.

Montague County.—Konrad Sztykgold 1 A. T. Adkins, A. Campbell Survey, outpost test to Lewis-Stuart field 4 miles southwest of the town of Montague, was drilling in shale at 5,185 ft.

In the Hundley area, Continental Oil Co. 2 H. A. Richardson, Block 78, Titus CSL, 7 miles southeast of Montague, kicked off after 3,000 gal. of acid through perforations in the Caddo lime at 6,060-84 ft. and flowed 339 bbl. of oil in 12 hours. Four miles southeast of Montague, Continental 2 Susette Myers, A. M. Boyd Survey, was drilling in shale below 5,660 ft.

Archer County.— Eight miles south of Wichita Falls, W. J. & J. J. Moran 2 William McGregor, Section 4, Block 1, H&TC Survey, was drilling below 5,070 ft. Top of the Ellenburger was expected around 5,400 ft. Same operators' 3 McGregor, same survey and block, was drilling below 3,000 ft.

Henry Grace Production Co. made location for its 1 L. F. Wilson estate, a 4,500-ft. wildcat 330 ft. from north and west lines, Block 1, Section 60, ATNCL Survey, north of production in CChalk Hill area.

Norden & Co. staked location for its 5 Wilson Properties, 5,000-ft. wildcat 1,263 ft. from north and west lines, Lot 1, Block 94, ATNCL Survey, 3 miles west of Geraldine.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCAT

Haskell County: T. D. Humphrey 1 E. A. Chapman "A," H. Tidwell Sur. 60, 6 mi. NE Haskell, pumped 18½ bbl. 38°-gravity oil a day, GOR 200 cu. ft., sand pay 2,496-2,520 ft., TD 2,534 ft., PB 2,520 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Brown County: W. G. Clark 1 Mrs. Ellen McGee estate, M. Stone Sur., 5 mi. SW May, dry, TD 1,572 ft.

Coleman County: Rose & Lebus Drilling Co. 1 J. W. Jones, 16-2-T&NO, 3 mi. S Novice, dry, TD 3,722 ft., Gardner sand 3,572 ft., had some oil and gas-cut mud on DST.

Comanche County: Richtex Petroleum Co. 1 Bartlett, Sec. 5, H&TC Sur., 2 mi. S Sidney, dry, TD 2,840 ft., Barnett shale 2,642 ft., Mississippian 2,726 ft.

Eastland County: C. H. Murphy & Co. 1 R. M. Day, 22-2-H&TC, 2 mi. NE Carson, dry, TD 3,683 ft., Caddo 3,240 ft., Marble Falls 3,275 ft., Ellenburger 3,614 ft.

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Oil Well Drilling Co. 1 E. D. Schoor, 50-3-H&TC, 5 mi. S Cisco, dry, TD 3,790 ft., Caddo 2,885 ft., Lake sand 3,125 ft., Marble Falls 3,332 ft.

Jones County: Sojourner Drilling Co. 1 D. C. Herring, G. W. Penny Sur. 271, 3 mi. N Noodle, dry, TD 5,451 ft., Dotham 2,300 ft., Noodle 2,405 ft., Ellenburger 5,375 ft., elev. 1,761 ft.

Palo Pinto County: T. G. Shaw, Trustee 1 W. A. Gragg, J. Poitevent Sur. 2, 5 mi. W Pickwick, dry, TD 4,200 ft., Caddo 3,615 ft., Marble Falls 3,975 ft., elev. 1,135 ft.

Shackelford County: C. E. Brownfield 1 Mannie Turner, Sec. 87, Blk. 11, T&P Sur., 9 mi. S Albany, dry, TD 1,170 ft.

Stephens County: Texas Pacific Coal & Oil Co. 1 M. P. Scruggs, J. B. Scruggs Sur., 4 mi. NE Crystal Falls, dry, TD 4,759 ft., Caddo 3,356 ft., Barnett 4,460 ft., Mississippian 4,530 ft., Ellenburger 4,643 ft., elev. 1,164 ft.

Taylor County: Hedrick Oil Co. 1 Armstrong, Blk. 11, Lge. 124, Grimes CSL, 3 mi. NE Merkel, dry, TD 2,825 ft.

Throckmorton County: Woodley Petroleum Co. 1 Spain estate "B," Sec. 940, TE&L Sur., 3 mi. NW Woodson, dry, TD 4,840 ft., Mississippian 4,695 ft.

OHIO, KENTUCKY

New Oil Area Opened in Perryton Pool Section

COLUMBUS.—Frank Brendel 1 Rolla Fairall (Ashcraft), Section 7, Jackson Township, Muskingum County, opens up a new producing area east of the Perryton pool, lying between the old pool and the new extension and ¾ mile from production. Clinton sand came in at 3,141-98 ft. and made 85 bbl. with 150,000 cu. ft. of gas in 24 hours after shot.

In the Bladensburg pool Shuff & Bucy 2 Guy Cotrell, Section 7, Jackson Township, Knox County, had a good showing of both oil and gas and flowed 100 bbl. in 24 hours after shot. Clinton was logged at 2,939-95 ft.

The National Gas & Oil Corp. moved ¼ mile northeast of the old Crooksville pool and brought in a nice producer on P. J. Hazelett, Section 9, Harrison Township, Perry County. Clinton sand at 3,541-93 ft. was shot with 100 qt. and made 80 bbl. in the first 24 hours.

Fourteen locations from eight counties were reported for the week, Ashland having three, and Knox, Noble and Meigs two each. Ashland field again led in completions with 7 out of 19.

EASTERN KENTUCKY

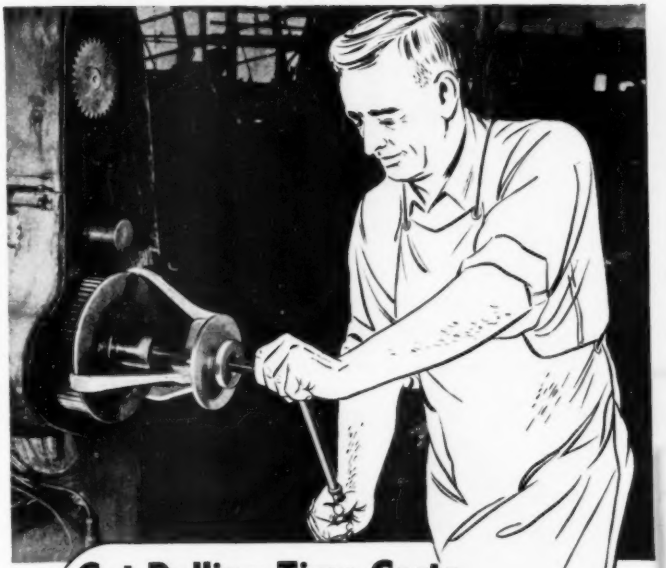
ASHLAND.—In Lawrence County, 1-T-80, Compton and Long are drilling at 2,258 ft. at 1 Wilson heirs, a rank wildcat designed to test the Big Six (Silurian) sand and shallower formations. Located in the northwestern corner of the county, the well is about 8 miles west of production in Fallsburg pool which produces from the Berea (Mississippian) sand.

Also in Lawrence County, and in Fallsburg pool, Dave Compton 1 Compton, 11-T-82, is drilling at 1,000 ft., to test the Berea sand. This is the first well to be drilled in this old field for some time.

In Martha pool of northwestern Johnson County, Ashland Oil & Refining Co. is cleaning out 3 W. H. Fyffe preparatory to drilling deeper. Currently producing from the Weir sand, the well will be carried to the Berea to test production in that horizon.

EASTERN KENTUCKY WILDCAT FAILURE

Carter County: Van Everman et al, 1 George Stevens, 8-V-79, dry, TD 1,765 ft., Berea



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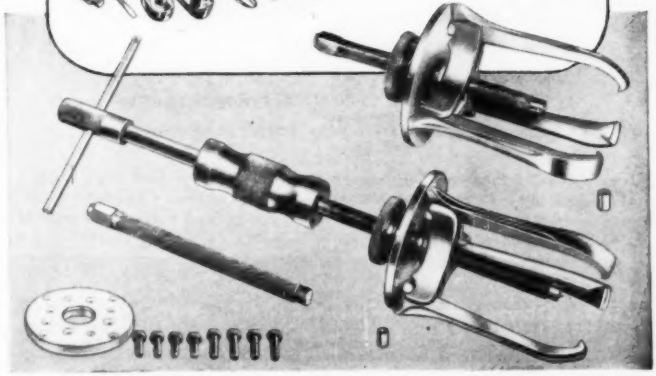

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WESTERN KENTUCKY

OWENSBORO.—The Union County wildcat between the town of Morganfield and South Morganfield pool is making an oil well. The well, J. Burhans, Sam Lewis, and Basin Drilling Co. 1 Addie Y. Lilly, 22-O-19, has been plugged back for the second time and is now reported to be swabbing at the rate of about 150 bbl. of oil and 50 bbl. of water per day. The hole was first plugged back to 1,855 ft. and later to 1,849 ft. to cut off water found in the bottom of the Waltersburg. The pay now under test is at 1,842-49 ft. Same operators have staked a northwest offset at 2 A. Lilly and Sun Oil Co. has an offset to the southeast at 1 J. W. Reburn.

To the southwest of the Lilly well and in South Morganfield pool, Sun 12 Lilly Binford, near the north line of 23-O-19, is making a good McClosky well from pay at 2,637-41 ft. The well made 426 bbl. of oil in the first 24 hours after the pay was shot and treated with acid. Production is being pinched back and amounted to 303 bbl. in the second 24 hours. The well is on the extreme south edge of the pool.

In the northern part of Daviess County, J. W. Tuttle, N. Lewis, and G. Poole 1 Shadwick, C E½ SE 8-Q-31, has been completed in the Cypress at 1,002-16 ft. with an initial production of 75 bbl. per day. The pay was given a 40-qt. shot.

INDIANA

EVANSVILLE.—Testing both the O'Hara and McClosky zones, Gilliam Drilling Co. 1 William R. Stitt, NW NE NW 12-4s-10w, southeastern Gibson County wildcat, swabbed 30 bbl. of clean oil per hour. The McClosky lime is perforated at 2,050-56 ft., with another prospective zone at 2,086-94 ft. The O'Hara lime is perforated at 2,014-18 ft. Each zone was given a 2,000-gal. acid treatment prior to swabbing. Separate swabbing tests of these zones resulted in a recovery of about 15 bbl. per hour from each. Total depth is 2,119 ft. with 5½-in. casing cemented at 2,100 ft.

Located about 4 miles from the nearest production, the Warrentown pool to the west, the well indicates the discovery of an entirely new pool. It is about 2½ miles northwest of the town of Elberfield and is just a short distance west of the Warwick County line and north of the Vanderburgh County line.

Ryan & Sharp 1 Elsie Lewis, SE SE NE 35-2s-12w, which opens another new producing area in Gibson County, has been completed on the pump making about 30 bbl. of oil and about 100 bbl. of water per day. Production is from the O'Hara lime, in which casing was perforated at 2,478-88 ft. It is about a mile south of the North Owensville pool.

Proving a new zone, the Salem lime (Lower Mississippian), for the Oaktown field in Knox County, has been established by Illinois Mid-Continent Co. and V & S Drilling Co. 1 Nettie Walden, NW SW SE 3-5n-10w, which has been completed on the pump for 35 bbl. per day. The pay is at a depth of 1,850-74 ft. Hole was drilled to 2,897 ft. in the Devonian, the field's main producing horizon, but failed to get commercial production there and was plugged back to 1,950 ft. In addition to the Devonian and the new Salem pay, the field also has production in shallow Pennsylvanian sands around 800 ft. Location of the new well is at the extreme north end of the field, just south of the Sullivan County line.

Encountering oil showings in the Cypress sand at 2,620-38 ft., Coy Oil Co. has another prospective new pool in its 1 Aldrich, SW NW NE 8-6s-14w, Posey County. Casing (5-in.) has been cemented at 2,607 ft. with bottom of the hole at 2,640 ft. preparatory to testing. The location is about 1½ miles northeast of the Maunie pool, just across the Wabash River in Illinois.

INDIANA SUCCESSFUL WILDCAT

Pike County: W. White 1 F. M. Neal, SE SW SW 12-1n-8w, IP 25 bbl., McClosky

1,297-1,302 ft., TD 1,302 ft. (Discovery well for Arda pool.)

INDIANA WILDCAT FAILURES

Gibson County: Walters and Appleby 1 M. Keith, SW NW NE 9-2s-12w, dry, TD 2,510 ft.

Spencer County: J. C. Ellis 1 F. Gourley, SW SE NW 11-6s-7w, dry, TD 1,620 ft.

Wabash County: Pipe Creek Oil, Inc. 1 F. D. Bowman, SW SW SE 13-26n-5e, dry, TD 1,062 ft.

PERMIAN BASIN

Scurry County May Get New Reef Lime Strike

MIDLAND.—A probable new strike in Scurry County, located near the center of the reef structure said to run from the northern tip of Sharon Ridge field north and east to near the upper county line, was reported at C. L. Norsworthy, Jr., 1 Williamson. Location is NW NW 256-97-H&TC, 7 miles west and 1 mile north of the town of Snyder.

A 4-hour drill-stem test in the Canyon at 7,044-56 ft. showed gas at the surface in 1 hour and 58 minutes. Volume was not gaged nor estimated. Recovery in the pipe was 220 ft. of 39°-gravity oil, 230 ft. of heavily oil and gas-cut drilling mud, estimated to have been 40 per cent oil, and 20 ft. of drilling mud cut with salt water and oil. Operators were to run electrical surveys before making further tests. The above test was said to be the well's first show of oil ar gas.

Tentative top on the reef lime has been placed at 6,965 ft., with elevation of 2,473 ft., or minus 4,096 ft. Four miles south and 1½ miles west, Lion Oil Co. 2 McLaughlin, SE SE Section 197, Diamond M Canyon field discovery, had the reef at minus 4,181 ft. The 1 Williamson is about level with dry holes in Schattel field, but some 50 ft. low to Schattel producers.

Geologist observers have pointed out the possibilities of this vast reef structure, either as a series of producing areas, or as one field eventually, but aside from local enthusiasts there have been no major company predictions as to its outcome.

Early reports on Superior Oil Co. and Intex Exploration Co. 1 Jordan, 3 miles northwest of Fluvanna, 680 ft. from east and 2,652 ft. from north lines, 579-97-H&TC, in the northwest corner of Scurry County, indicated a possible discovery in the Ellenburger. While the operators had released no data, field sources gave a tentative top on what is believed to be the Ellenburger at 8,450 ft. A 45-minute drill-stem test around 8,445-70 ft. was said to have recovered 1,400 ft. of oil, with no water.

Other Scurry County activity included a south extension at North Snyder. Cities Service Oil Co. 1 Jolly, approximately NE NW Section 393, topped the reef at 6,388 ft. and made two flowing tests through drill stem, the first gaging 73 bbl. of oil in 2 hours, and the second, 128 bbl. of oil in 3 hours. In Diamond M field, two completions extended the proven area. West of the discovery in Section 197, Lion Oil Co. 6 McLaughlin made a natural flowing potential of 384 bbl. of 43°-gravity oil from perforations at 6,580-6,605 ft and 6,613-27 ft.

On the east side of the field, Lion 2 Jack Wilson, NW SW Section 196, flowed naturally 422 bbl. og 43°-gravity oil in 24 hours, from perforations at 6,670-6,708, 6,712-20 and 6,728-50 ft. Third producer for Sharon Ridge Canyon field was Pearson-Sibert Oil Co. 1-A Bishop, southwest offset to the discovery in Section 162, which flowed at the rate of 745 bbl. of oil a day, through 11/32-in. choke.

One-half mile east of Kelly field discovery, Magnolia 2 Winston, Section 11, Block 1, J. P. Smith Survey, recovered 180 ft. of oil and gas-cut mud, 810 ft. of 43°-gravity

QUICK

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oil, 60 ft. of heavily oil and gas-cut mud and 30 ft. of salt water on a drill-stem test from 6,839-62 ft., in the Canyon lime. Tool was open 3 hours. Magnolia staked location for a west offset test to its 1 H. G. Moore, west of Snyder. The new operations is to be the 1 Ida Maxwell, SE SE 206-97-H&TC, scheduled to 7,350 ft.

Borden County.—Sinclair Oil & Gas Co. 1 S. C. Williams, 45-32-T6N-EL&R, Ellenburger prospect 11 miles northewst of Gail, prepared to set casing for completion. Additional salt water was developed after deepening from 10,000 ft. to 10,035 ft.

Andrews County.—Perforations in the upper Fusselman section at Magnolia Petroleum Co. 18-B Cowden, southwest of Dollar Hide field in Section 12, Block A-55, resulted in greatly increased production from the Silurian. Last perforations were from 11,000-26 ft., which had been treated with a total of 19,000 gal. Flowing through ¾-in. tubing choke, the well gaged 227 bbl. of clean oil, 84 bbl. of drilling mud and 30 bbl. of acid water in 24 hours. Production tests had not been started in the Devonian. North of the field, Cities Service Oil Co. 1-E Cowden flowed 206 bbl. of oil in 12 hours, on the first test of the Clear Fork, at 6,545-50 ft. The well had kicked off after being treated with 5,000 gal. of acid. Flow was gaged through 19/32-in. choke, on a gas-oil ratio of 975 cu. ft. It was shut in for storage, and a permit for dual completion. The well failed in the Silurian but gaged 380 bbl. of oil a day from the Devonian at 7,755-7,800 ft. Location is about 1 mile north of Ellenburger and Devonian production, but 3 miles north of the nearest Clear Fork producer.

Runnels County.—Fred M. Manning, Inc., 1 S. L. McNay, wildcat 3½ miles northwest of Wingate in Section 293, J. Jeffries Survey, reported additional oil on drill-stem tests, which were thought to be still in the Pennsylvanian. Drilling was resumed below 5,464 ft.

In the northwest corner of the county, Humble Oil & Refining Co. 1 Odom, 6,000-ft. wildcat in the Felix Sosa Survey, and 4 miles southwest of Manning 1 McNay, was drilling ahead below 5,385 ft. after testing gas and 42°-gravity oil in the Strawn.

WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURES

Coke County: Placid Oil Co. 1 Robert Foreman, SE SE 450-1A-H&TC, dry, TD 4,999 ft., swabbed 100 bbl. oil and 800 bbl. sulfur water in 24 hr. after perforating at 4,982-94 ft., hole caved, perforated 4,850-56 ft., acidized, swabbed all salt water.

Crockett County: Oliver and Kotza 1-A Caruthers, NE SW SW 24-UV-GC&SF, dry, TD 1,460 ft. in sulfur water.

Frank & George Frankel 1-503 "A" University, approximately SW SW 12-30-University Lands, 7 mi. SW Todd Deep field, dry, TD 8,615 ft., Strawn 7,576 ft., Devonian 7,780 ft., Simpson 7,950 ft., Waddell 8,330 ft., Ellenburger 8,420 ft., elev. 2,707 ft., recovered some oil in Ellenburger.

Culberson County: Freeport Sulphur Co. 1 A. V. Stein, 16-111-PSL, 25 mi. W Orla, dry, TD 2,118 ft. in Delaware sand topped 2,074 ft., elev. 3,313 ft.

Texzona Producing Co. 1 Hillary Phillips, 14-110-PSL, dry, TD 2,246 ft.

Kent County: Davis and Hiawatha Oil & Gas Co. 1 Bert Wallace, NW NW 57-98-H&TC, 5 mi. SE Clairmont, dry, TD 7,135 ft., Mississippian 6,800 ft., Ellenburger 7,084 ft., elev. 2,037 ft.

Pecos County: Anderson & Word 1 Lowery & Wilson, 10-Z-TCRR, 9½ mi. SW Iraan, dry, TD 1,970 ft.

Reagan County: Stanolind Oil & Gas Co. and Danciger Oil & Refining Co. 1 E. P. Miller, SE NW NW 226-1-T&P, 3 mi. NW Barnhart field, dry, TD 9,799 ft., PB 9,590 ft., previously reported as Fusselman discovery, perforated 9,535-85 ft., acidized and flowed 244 bbl. 44°-gravity oil in 14 hr. through 2-in. then gaged 417 bbl. oil in 18 hr., perforated 9,695-9,735 ft., and swabbed all salt water, PB 9,651 ft., oil declined to 18 bbl. and 10 bbl. water, top Devonian 9,380 ft., Silurian 9,450 ft., Fusselman 9,505 ft., Ellenburger 9,645 ft., elev. 2,706 ft.

British-American Oil Producing Co. 1 S. A. Hull, NE NE 70-2-T&P, 33 mi. SE Garden City, dry, TD 6,490 ft., no shows.

Superior Oil Co. of California and Atlantic Refining Co. 1-A-11 University, NE NE 20-11-University Lands, 2 mi. SW Big Lake, dry, TD 10,516 ft., Devonian 9,260 ft., Silurian 9,280 ft., Fusselman 9,537 ft., Simpson 9,585 ft., Ellenburger 9,690 ft., elev. 2,632 ft.

Reeves County: Texzona Production Co. 1 J. M. Hickey & Son, 16-56-PSL, 25 mi. NW Pecos, dry, TD 4,560 ft., Delaware sand 3,293 ft., elev. 3,216 ft., no shows.

Runnels County: E. P. Griffin 1 Henry Fowler, NE NE NE 70-acre lease, G. W. Dyer Sur., 6 mi. NE Ballinger, dry, TD 3,978 ft., Palo Pinto 3,577 ft., Gardner sand 3,850 ft., Gray sand 3,965 ft., elev. 1,677 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Continental Oil Co. 1-A-29 Warren, SE NW 29-20s-33e, northwest offset test to its Warren field discovery in the McKee sand, indicated confirmation production and promised to equal the discovery in production. The 1-A-30 Warren, discovery well, was rated at 3,450 bbl. of oil a day, initial potential.

The 1-A-29 topped the McKee sand at 8,808 ft., on an elevation of 3,538 ft., said to be structurally higher than the discovery. Five cores from 8,879-9,039 ft. recovered 160 ft. of saturated sand. Details on cores from 9,039-9,138 ft. were not reported. A drill-stem test from 8,885-9,039 ft., open 2½ hours, had gas in 6 minutes, gaged at 1,315,000 cu. ft. daily, and flowing oil in 30 minutes. During the balance of the test it tanked 194 bbl. of oil, and unloaded oil while coming out of the hole. At last report it was drilling ahead below 9,138 ft.

Stanolind Oil & Gas Co. 1 Federal-Leonard, SE SE 11-26s-37e, 5 miles northeast of Jal, was drilling ahead below 10,525 ft. in lime. Northeast of production in the Drinkard field, Southern Union Gas Co. 1 State, 2-21s-37e, was drilling below 6,055 ft.

Ralph Lowe 1 Frank Selman, NW SW 11-19s-38e, 2 miles south of Hobbs, was drilling in lime at 8,347 ft. Drill-stem tests at 8,002-8,104 and 8,110-8,220 ft. recovered sulfur and salt water.

McAlester Fuel Oil Co. 1 Denton, SW SE 11-15e-37e, was drilling at 8,388 ft. in lime and shale.

Amerada Petroleum Corp. 1-BTB, 26-12s-33e, reported the following hourly flows on a 5-hour drill-stem test from 8,788-8,852 ft., which had gas in 3 minutes, mud in 55 minutes and oil in 1 hour: First hour, gaged 22.8 bbl. of oil cut 4 per cent with sediment; then 17.25 bbl. oil, with same cut; 14.49 bbl. during both third and fourth hour. Gas was estimated at 100,000 cu. ft. daily; oil was 44.8° gravity and flowing pressure was 1,250 psi., and 3,235 psi. shut in. Following the test, operators cored ahead below 8,895 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Eddy County: Continental Oil Co. 1-8 State, NE NE NW 8-19s-29e, dry, TD 3,045 ft., Yates 965 ft., red sand 1,887 ft., San Andres 2,670 ft., elev. 3,392 ft.

MISSISSIPPI

Good Wilcox Producer Is Completed for 246 Bbl.

JACKSON.—Hodge, Gilster & Kemp 1 Lehmann Brothers, in 28-7n-2e, Franklin County, has been completed as one of Mississippi's best Wilcox producers. Drilled to a total depth of 6,055 ft., the well flowed 246 bbl. of 35.5°-gravity oil per day through 11/64-in. choke, with tubing pressure of 420 psi. and casing pressure of 380 psi.

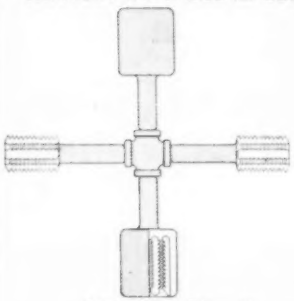
Humble Oil & Refining Co. 14 Gulf Coast Realty Co., 18-4ss-30e, in Collier County, has been completed as a producer. Drilled to a total depth of 11,476 ft., the well flowed 189 bbl. of 25.2°-gravity oil per day through 3/8-in. choke, with tubing pressure of 120 psi.

There were four new field locations made during the week; five field locations were completed; and one dry wildcat located in Adams County.

MISSISSIPPI WILDCAT FAILURE

Adams County: Dorris Ballew, Inc., 1 Natchez Country Club, 12-7n-3w, dry, TD 7,005 ft.

CLEANOUT TAP & DIES for RODS



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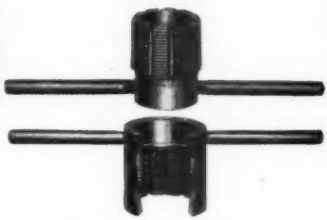

2" to 4" PLAIN and EUE ROUND and V-THREAD

Patent No. 2110618

OKLAHOMA

New Cromwell Sand Pool Found in Okfuskee County

FALCON SEABOARD DRILLING CO. has discoverd what appears to be another Cromwell sand pool in Okfuskee County in its 1 Annie Sarnia, SE SE SW 14-13n-8e. In a drill-stem test of the sand at 3,436-45 ft., with tool open 10 minutes, gas showed in 2½ minutes and oil started flowing in 7 minutes. When tool was pulled, 540 ft. of clean oil was recovered. Casing (7-in.) has been run for production tests.

The new well is 1½ miles southwest of the Southwest Welty pool, which the same company discoved last January and which is producing from the same zone at approximately the same depth.

A new, deeper pay zone for the Knox pool in Grady County has been found by Ohio Oil Co. in its 1 Tims, SE SE NW 6-3n-5w. Originally completed at 4,742 ft., the hole was deepened to 5,388 ft., where, in a 45-minute drill-stem test from 5,352 ft. to bottom, a recovery of 1,125 ft. of oil was made. Gas showed in 3 minutes and flowed at an estimated rate of 1,500,000 cu. ft. per day. Oil started to flow in 8 minutes at the rate of 20 bbl. per hour. With hole deepened to 5,489 ft. and packer set at 5,389 ft., a 90-minute test was made in which gas showed in 7 minutes and a recovery of 850 ft. of oil made. To complete, 5½-in. casing has been cemented at 5,368 ft.

Smiley & Little and M. T. Myers are opening a new producing area north of the Pauls Valley pool in their 1 Trudgeon, SW SW SW 14-4n-1w, which is flowing 5½ bbl. of oil per hour through tubing from the Pennsylvanian. Hole was drilled to 4,716 ft. in the Bromide and hole plugged back to 4,441 ft. with 5½-in. casing at 4,426 ft. Formation was shot with 20 qt.

Extension of the Elk City field in Beckham County 1½ miles northeastward into Washita County is indicated by drill-stem test in E. Constantin, Jr., 1 Lambert, C SW SW 18-10n-20w. Taking in a zone at 9,406-84 ft., and with tool open 1 hour, the well started flowing in 9 minutes at the rate of 50 bbl. of distillate per hour and 10,000,000 cu. ft. of gas per day. When tool was pulled, 630 ft. of distillate was recovered.

A mile and a half northwest of the field, Shell Oil Co. 1 McKenzie, C NE SW 9-10n-21w, flowed 428 bbl. of 51°-gravity oil in 10 hours through 20/64-in. choke on initial production test with casing perforated at 9,400-35 ft. Gas flow was checked at 75,000 cu. ft. per hour with pressures of 1,850 psi. on the tubing and 780 psi. on the casing.

Sunray Oil Corp. and Phillips Petroleum Co. are starting an interesting deep test on the east flank of the shallow Chickasha gas field in Grady County. Projected to 12,000 ft., the test will explore the possibilities of oil production in the Springer sands. Location is for 1 Wood, SE SE SW 1-4n-8w.

OKLAHOMA SUCCESSFUL WILDCATS

Coal County: Robertson 1 Daniel, SW NE SW 27-1n-9e, 2,000,000 cu. ft. of gas from sand at 6,915-75 ft., TD 7,218 ft.

Cotton County: Ross 1 Eastman "B," NE SE NE 17-5s-11w, pumped 27 bbl. of 41°-gravity oil per day from sand at 1,754-65 ft., TD 1,787 ft.

Oklahoma County: Gulf Oil 1 Perkins, C SW SE 34-13n-2w, gaged 2,612,000 cu. ft. of dry gas from lower conglomerate at 5,539-55 ft., TD 6,245 ft.

OKLAHOMA WILDCAT FAILURES

Beckham County: Jordan 1 Caudill estate, SE SE 27-9n-25w, dry, TD 7,626 ft., tight hole.

Comanche County: Creel 1 Wolverton, NE SW SW 34-2n-11w, dry, TD 250 ft.

Cotton County: W & B Oil Co. 1 Grimes, NE SE SE 15-2s-11w, dry, TD 2,099 ft.

Garfield County: Bracken Oil 1 McCabe-Bates, SE SE NW 18-23n-3w, dry, TD 5,270 ft., Oread 3,128 ft., Tonkawa lime 3,367 ft., Layton 4,235 ft., Oswego 4,745 ft., Mississippian Chattanooga 5,226 ft.

Hughes County: Sherrod 1 Meyer, NE SE SW 30-7n-9e, dry, TD 1,090 ft., sand 700-30 ft., gray shale 730-85 ft., lime 785-90 ft., red bed 790-800 ft., gray shale 800-25 ft., sand 825-55 ft., shale 855-95 ft., lime 895-900 ft., shale 900-25 ft., Calvin sand 938-46 ft., shale 946-1,090 ft.

Kay County: Woods Drilling 1 Rollins, NW NW SW 23-29n-1e, dry, TD 3,940 ft.

Lincoln County: Suntex Drilling 1 Oliver, SW SW SE 12-14n-5e, dry, TD 3,343 ft.

Grayhill Drilling 1 Gustin-Ingalls, SE SE SW 20-14n-6e, dry, TD 5,140 ft., Hogshooter 2,012 ft., Checkerboard 2,348 ft., conglomerate 2,425 ft., Oswego 3,308 ft., Prue 3,380 ft., lime 3,685 ft., Red Fork 3,732 ft., Inola 3,915 ft., lime 4,092 ft., unconformity 4,335 ft., Mississippian Caney 4,405 ft., Mayes 4,618 ft., Woodford 4,862 ft., Hunton 4,890 ft., Sylvan 4,952 ft., Viola 5,025 ft., first Wilcox 5,082 ft., second Wilcox 5,130 ft.

Wilcox 1 Foreman, NE NE NE 24-14n-6e, dry, TD 4,200 ft., no Layton, Checkerboard, 1,990 ft., no conglomerate, Oswego 2,891 ft., Prue 2,913 ft., Verdigris 2,932 ft., Skinner lime 3,000 ft., Inols 3,292 ft., Bartlesville 3,304 ft., Mississippian Caney 3,636 ft., Hunton 4,018 ft., Sylvan 4,042 ft., Viola 4,116 ft., Simpson 4,152 ft., first Wilcox 4,191 ft.

Logan County: Williams 1 Shannon, SW SW SW 11-16n-1w, dry, TD 5,765 ft., Big lime 4,860 ft., Oswego 4,924 ft., Cherokee 4,978 ft., Prue 5,000 ft., Verdigris 5,032 ft., Red Fork 5,220 ft., basal Pennsylvanian-Woodford 5,348 ft., Hunton 5,293 ft., Sylvan 5,374 ft., Viola 5,462 ft., first Wilcox 5,638 ft., Marshall 5,662 ft., second Wilcox 5,722 ft.

Love County: California 1 Brannon, NW NE SE 30-7s-3e, dry, TD 10,264 ft., basal Trinity-Pontotoc 570 ft., Hoxbar 1,312 ft., Deese 4,810 ft., Dornick Hills (?) 9,465 ft., basal Pennsylvanian-Mississippian Caney 9,570 ft., Sycamore 9,704 ft., Woodford 9,830 ft., Hunton 10,022 ft.

Noble Drilling 1 State, NE NE SW 13-21n-1w, dry, TD 5,225 ft., Big lime 4,125 ft., Oswego 4,172 ft., Mississippi lime 4,800 ft., Woodford 5,012 ft., Viola 5,073 ft., first Wilcox 5,122 ft., Marshall 5,132 ft., second Wilcox 5,196 ft.

Okfuskee County: Mid-Continent 1 Shero, SE SW SW 28-13n-7e, dry, TD 4,193 ft., Hogshooter 1,470 ft., Layton 1,597 ft., Checkerboard 1,843 ft., conglomerate 1,883 ft., Oswego 2,824 ft., Prue 2,909 ft., Inola 3,388 ft., Bartlesville 3,390 ft., lime 3,533 ft., Mississippian Caney 3,727 ft., Woodford 4,146 ft., Hunton 4,178 ft.

Okmulgee County: Youngblood 1 Rader, NE NW SE 1-13n-12e, dry, TD 1,750 ft.

Payne County: Callery 1 Hogrefe, SW SW NE 15-17n-4e, dry, TD 4,391 ft., Woodford 4,155 ft., Sylvan 4,192 ft., Viola 4,255 ft., dolomite 4,300 ft., Wilcox 4,310 ft., sandy dolomite 4,335 ft., second Wilcox 4,345 ft.

Stephens County: Davis 1 Louis, SW NE NE 33-2s-6w, dry, TD 2,598 ft., Loco lime 1,657 ft., lower Canyon lime 2,517 ft., Simpson 2,585 ft.

ILLINOIS

New Haven North Extension Gets Second Good Producer

MATTOON.—The second well for the new Waltersburg sand area recently opened by George & Wrather and Barclay Oil Co. in Section 3-7s-10e, between the New Haven and Concord Central pools in White County is showing up even better than the discovery producer, which pumped and flowed 450 bbl. of clean oil per day. The second well, Sohio Petroleum Co. 1-B Roy Pearce, SW NE NE 3-7s-10e, a diagonal northwest offset to the discovery well, is swabbing and flowing at the rate of 500 bbl. per day. Sand in this well is at 2,136-50 ft., which is slightly higher than in the discovery producer. The new wells are about ¾ mile from other production and rate as extensions to the New Haven North pool.

A rank wildcat in Bond County, Hoiles Petroleum Co. 1 Hoiles, SW SW SW 13-4n-3w, is showing for a possible small producer in the Benoist sand. It is cleaning out and testing after perforating casing with 48 holes at 1,119-24 ft. It is about 5 miles northwest of the Beaver Creek pool, nearest production.

Charles A. Baldwin's prospective new pool opener in Jasper County, his 1 James, SW SW SW 27-6n-14w, is being put on the pump for tests of favorable showings encountered in the Rosiclare at 2,667-75 ft. and 2,682-90 ft. Casing, cemented on bottom at 2,720 ft., was perforated in the above zones. Nearest production is in the Ste. Marie pool, 3 miles to the south.

ILLINOIS SUCCESSFUL WILDCAT

Jasper County: Baldwin and Graham 1 C. Burton, NE NE NE 33-6n-14w, IP 35 bbl., Rosiclare 2,686-91 ft., TD 2,800 ft.

ILLINOIS WILDCAT FAILURES

Edgar County: L. L. Groff 1 Buhcock, NE NE NW 4-12n-13w, dry, TD 610 ft.

Cumberland County: J. M. Miller 1 Flood, NW NW SE 22-9n-8e, dry, TD 2,670 ft.

Edwards County: F. A. Noah & Son 1 Tanguary, SW SE SE 27-1n-10e, dry, TD 3,352 ft.

Gallatin County: George E. Engle 1 E. Maloney, SW NW NW 36-8s-9e, dry, TD 2,210 ft.

Sohio Petroleum Co. 1 Dratton, SE NE SE 23-9s-8e, dry, TD 2,590 ft.

Saline County: C. E. Brehm 1 J. T. Garner, SW NW SE 35-7s-7e, dry, TD 2,935 ft.

Wayne County: Pure Oil Co. 1 E. Van Fossen, NW NE NE 19-1n-9e, dry, TD 3,352 ft.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington, 25, D.C. Notice is hereby given that the lands listed herein are offered through sealed bids on the terms hereinafter specified, to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the lands under sec. 17 of the Leasing Act of February 25, 1920 (41 Stat. 437; 30 U.S.C. sec. 181), as amended. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D. C., on or before 1 p.m. of the date set out herein. Each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank or by money order made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.42 (b) and (c). The envelopes should be plainly marked that they are not to be opened before the date and hour set out herein, and should show the number of the parcel and the name of the field. No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental must be paid and an acceptable surety bond in the sum of at least double the amount of rental, but in no case less than $1,000 nor more than $5,000, must be furnished by a successful bidder prior to the issuance of a lease. An acceptable $5,000 surety bond will be required prior to commencing drilling operations on the land. The deposits of the other bidders will be returned upon acceptance of the successful bids. Bidders are warned against violation of section 59, U.S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Royalties payable to the United States will be at the rate of 12½ per cent to 25 per cent for oil, and 12½ per cent to 16⅔ per cent for gas, in accordance with Schedule B in the lease form. Annual rental will be at the rate of $1.00 per acre. The land is offered in one parcel described as the E½SE¼ sec. 35, T. 24 S., R. 36 E., N.M.P.M., New Mexico, 80 acres and is within the known geologic structure of the Cooper Field. Bids must be submitted on or before 1:00 P.M. Daylight Saving Time, June 29, 1949. Marion Clawson, Director.

Cameron

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Split bonnet, held together by two alloy steel bolts, facilitates removing stem packer.
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Heat treated alloy steel gate shown in closed position embedded in the resilient flow-way insert. In open position, it is retracted completely out of the flow-way.
Lip-type stem packer requires no packing gland.
Renewable resilient flow-way insert which absorbs cutting action of abrasive laden fluid and which may be replaced in the field quickly and at low cost. Note how the resilient insert provides a pressure-tight seal for the gate and seals the two-piece valve body.
Replaceable alloy steel wear ring which protects the hub ends against cutting.
Hubs with any type of end connection desired are interchangeable and are attached to the body by interlocking shoulders and grooves. Loosen the body bolts and the hubs will swivel like a union when making up in a manifold.
Forged steel body in two pieces to facilitate changing the flow-way insert.

The Inside Story

There is no other valve like the Cameron Flex-Seal. It was designed for one service and one service only . . . drilling mud and similar abrasive fluids which quickly cut out the metal-to-metal seal in ordinary all-purpose valves.

The *inside story* of the valve that has revolutionized mud line manifolding is presented at left. Operators who may not be familiar with its unique design are invited to study this sectional view or, better still, order a few Flex-Seals and check their performance under actual operating conditions.

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International

WORLD-WIDE OIL DEVELOPMENTS

Italy Drops Plan to Open Oil Development to Private Firms

AMENDMENTS to the Italian Mining Law which would open up the country to large-scale exploration by private capital have been held up indefinitely.

Several large companies, both foreign and Italian, have indicated plans for considerable work as soon as workable legislation is provided. Among them is Standard Oil Co. (N.J.), which has the exploration company, SPI (Soc. Petrolifera Italiana), in the Lower Po Valley.

The present law is considered antiquated, but the acceptable amendments proposed earlier this year were shelved in the Council of Ministers. There is some hope of reconsideration and a more favorable decision in the next few months.

The only important exploration and drilling operations in the country being conducted now is by the government-controlled AGIP (Azienda Generale Italiana Petroli). AGIP has made several significant gas discoveries in the Upper Po Valley since the war, with some indications of oil.

Monopoly Seems Favored

The outcome of the proposed amendments is expected to determine whether the country will be opened up to private capital or petroleum exploration remains virtually a government monopoly. There is some sentiment for a government monopoly in gas if not for both gas and oil.

The amendments which were proposed were the result of extended efforts to provide adequate legislation for private capital. Objections to the present law include features failing to guarantee to the operator the right to develop and produce his discovery and also to limitations on the size of the exploration blocks.

The amendments were designed to bring the Italian legislation in line with petroleum laws elsewhere. A royalty of 8 per cent was provided, with 30-year concessions renewable for an additional 20 years. Acreage obtained would depend on the exploration program submitted.

Several large Italian industrial concerns especially interested in the possibility of obtaining natural-gas supplies are regarded as possible operators if the amendments are enacted. Eighty small operators have joined together as a unit to seek acreage. Also affected is MacMillan Petroleum Corp. which has done exploration work in Sicily.

AGIP is reported recently to be using German-made equipment for some of its drilling operations. The government organization is said to have a production capacity in the Po Valley for 250,000,000 cu. m. of natural gas (8,830,000,000 cu ft.).

Pancoastal to Enter Canadian Operations

WHAT amounts to virtually a controlling interest in Albercan Oil Corp., which holds extensive reservations and leases in Canada, has been acquired by Pancoastal Oil Co., C.A.

The acquisition was through Peninsula Oil Leases, Inc., controlled by Pancoastal. Peninsula has taken 36 per cent of the capital stock of Albercan, and J. E. Fitzpatrick, president of Peninsula, has been named president of Albercan.

The Albercan properties total about 2,200,000 acres in leases and reservations in Alberta and Saskatchewan. They were assembled by Bryan Newkirk, Toronto, and associates, who will continue to have large stock participation, though control and management is with Peninsula through its purchase and what was described as collateral arrangements.

Fitzpatrick said that geophysical and geological studies are under way and that a drilling program will be launched in the near future. Peninsula at present has leases in Texas and in Florida, mostly tideland areas. The company is preparing to drill in the near future on a location on the Florida Keys.

New Production Found In Eastern Venezuela

NEW oil production has been found in Eastern Venezuela about 15 miles south of Tucupido field on a concession of Venezuelan Atlantic Refining Co. and Pancoastal Oil Co., C.A.

On production tests on sands between 4,414 and 4,465 ft., the well 1 Ruiz, flowed at a rate of approximately 800 bbl. daily of 28°-gravity oil. The tests were through a $\frac{3}{8}$-in. choke.

The discovery was said to have apparently opened up a new field. The well is on the Joseph Ruiz property and is located in the center of a 12,000-acre concession. It is about 29 miles east of Texas Petroleum Co.'s Palacio and Mercedes fields.

A step-out location 1,200 m. to the east of the discovery is to be spudded within the next 2 weeks. One rig is being operated in the area.

Pancoastal and Venezuelan Atlantic are joint owners of some 327,000 acres of concessions in Eastern Venezuela, with Atlantic as the operator. Their Tucupido field produces about 8,000 bbl. daily.

Minor Oil Strikes Are Reported in Algeria

New discoveries of apparently minor importance are reported to have been made recently in Algeria in North Africa. Near Aumale, southwest of Algiers, a well found a productive formation at 800 m. (about 2,600 ft.) estimated for about 35 bbl. daily. Another report from Paris said a well at Oued Gueterini, 100 km. southeast of Algiers, tested about 6 bbl. of oil at a depth of 640 m. (about 2,100 ft.)

Drilling is being done by Soc. Nationale de Recherche et d'Exploitations des Petroles en Algerie, and the Algerian and French governments have been promoting exploration work.

Venezuelan Oil Market Seen Endangered by Operating Costs

International

RECENT trends in the cost of production in Venezuela must be promptly reversed or the country's oil will be placed at a disadvantage in the increasingly competitive markets of the world.

Joseph E. Pogue, vice president of the Chase National Bank and one of the most widely recognized students of the economics of the petroleum industry, makes this point in a 46-page study, "Oil in Venezuela," which has been published by the petroleum department of the bank.

Pogue's analysis is a detailed discussion of the importance of the oil industry to Venezuela, the flow of funds from oil back into the country's economy, and the effect of current policy upon the industry. Contrary to the popular view, he says, the key to the petroleum industry is the market, not the producing well.

J. E. POGUE

Future Venezuelan exports will depend in the main upon the growth of Western Hemisphere markets, the supplies competitively available, their relatively delivered costs, and other factors. Accordingly, investment and producing costs in Venezuela will assume a decisive role in determining the rate of production, he says.

Pogue's comments on the Venezuelan industry and his recommendations for its long-term economic health become of particular interest in view of the fact that the country's oil policy is now being studied by a special government commission headed by Pedro Ignacio Aguerrevere, former minister of fomento.

The report of this group is expected to be made in the next 6 weeks or 2 months, and some observers believe it will call for the award of new concessions and possibly some easing of the tax load on the industry.

The action of the Venezuelan Government in removing new concessions from the market in 1946 was cited by Pogue as one of four examples of measures "which are likely to prove restrictive to sustained economic progress." The withdrawal of new concessions, Pogue says, occurred at a time when the demand for them was great and has had the effect of diverting some exploration effort from Venezuela to other countries such as Canada and the Middle East.

The other three handicaps named by Pogue were: the requirement of Venezuela that a portion of oil production in excess of local needs be refined in the country; the labor policy of the state; and the government's "50-50" theory of oil taxation.

The requirement for refining in the country, which is now resulting in the construction of four plants in the country, has caused very large capital expenditures at inflated costs which may weaken the competitive position of Venezuelan oil, Pogue declares. "The products turned out will have difficulty in competing in world markets, and this may result in lessening the value of the raw material and reducing royalty revenue to the state," he says. "Moreover, an increasing number of consuming countries are requiring that oil be refined within their borders, so demand is tending to take the form of crude-oil requirements, not that of products."

Pogue discusses the labor situation at length. He concedes the government's policy is advantageous from the point of view of rapid social advancement for a limited group but says: "It has raised the wage differential between the oil worker and other workers so rapidly, has increased operating costs so sharply, and above all, has so augmented the capital cost of expanding the labor force, that future growth is bound to be handicapped."

Labor costs in Venezuela are among

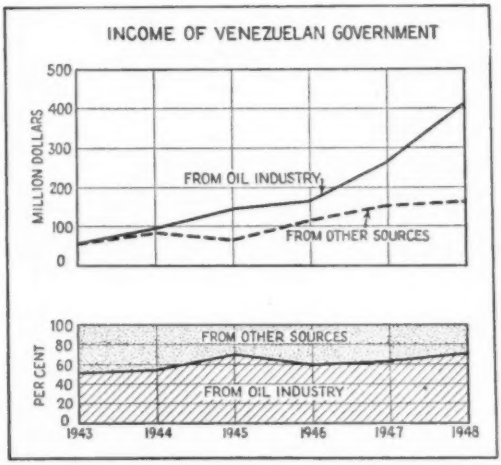


Fig. 1—Chart showing yearly income of Venezuelan Government received from oil industry compared with income from other sources. 1943-1948

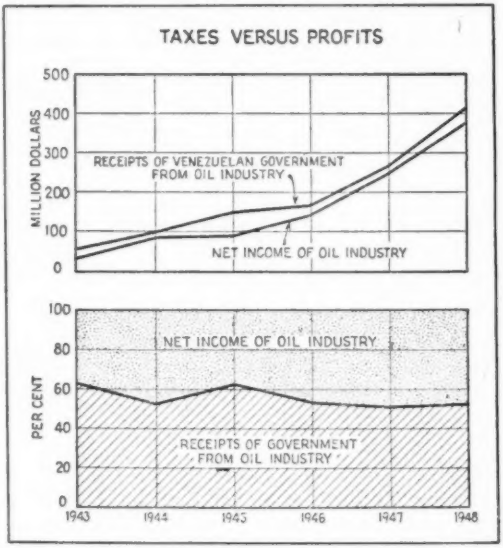
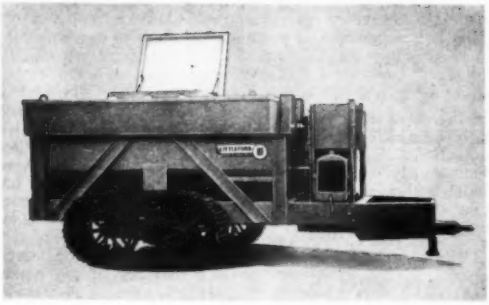


Fig. 2—Chart showing relative yearly return to Venezuelan Government and to petroleum industry of income from oil operations. 1943-1948



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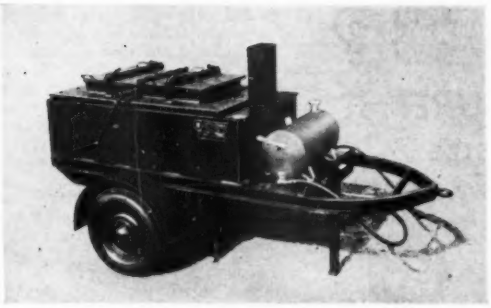

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WORLD-WIDE OIL DEVELOPMENTS

the highest in the world. Pogue calculates it to be $15.13 per man per work day. Total daily take-home pay is the equivalent of $9.84; indirect pay amounts to $1.12; and indirect benefits aggregate $4.17. The total $15.13 figure includes not only basic wage but bonuses, rest days, overtime, travel time, vacation pay, profit sharing, indemnities, medical benefits, housing allowance, travel allowance, school expense, and other related items. In addition, some companies incurred additional expense averaging 80 cents a man a day for retirement plans, death benefits, group insurance, and other benefits.

"It is apparent that the oil worker, supported by liberal labor laws and a strong labor organization, has directly benefited tremendously from oil developments. . . ." Pogue says. "The outcome has not been forced on a reluctant industry, for management has promoted the social advances of the worker and apparently has regarded the requirements of the law and collective bargaining as a platform on which to build an employe-relations program which stands as further testimony to the constructiveness of enlightened enterprise. And yet some queries obtrude: the cost effect upon the competitive position of Venezuelan oil in world markets; the consequences to the worker himself of advantages which have come too quickly for balanced absorption; and whether the time has not arrived for local citizens to conduct many of the service operations which have thus far, and in the formative stages perhaps appropriately, been the responsibility of the petroleum industry."

As for taxes levied on the industry in Venezuela, Pogue says the "50-50" theory, under which the government planned that the sum of royalty and other taxes would give the nation a participation equal to the industry's net profits, was inaugurated in a period when net income was overstated. By its so-called one-time tax in 1945 and the amendment of the surtax rates in 1946, the government abandoned its original conception of equal participation with the industry as a whole over the life of the oil operations. In its place was substituted the idea that the theory should be applied to each company separately and to each year separately "without any spread over the fat and lean years."

Nation Gets Big Half

"In the past 6 years the government collected from the industry in the form of royalties and taxes the sum of $1,131,000 compared with the industry's net income of $971,000," Pogue says. "For this period the ratio was 54-46, and the excess in favor of the government was $160,000,000. In strict logic, however, the only true return on an investment is the cash payments derived from it—dividends in the case of corporations. In the past 6 years the dividend payments of the Venezuelan oil industry have amounted to $444,000. Therefore the ratio of government receipts to the industry's dividends was 72-28. Thus '50-50' has worked out on this more realistic basis to be about 70-30."

In 1948, Pogue's tabulation shows the industry-government income position as follows:

Received by government from oil industry:	
Rolayties	$204,000,000
Income taxes	151,000,000
Import duties	15,000,000
Concession-carrying taxes	10,000,000
Miscellaneous	11,000,000
Initial exploration and exploitation taxes	13,000,000
Annual exploration taxes	1,000,000
Services	6,000,000
Total to government	$411,000,000
Net income to oil industry	$377,000,000
Excess of government receipts over industry net income	34,000,000
Ratio of government receipts to industry's net income	52-48

Pogue also pointed out that the Banco Central realizes a substantial gain by purchasing dollars from the oil companies at 3.09 bolivars to the

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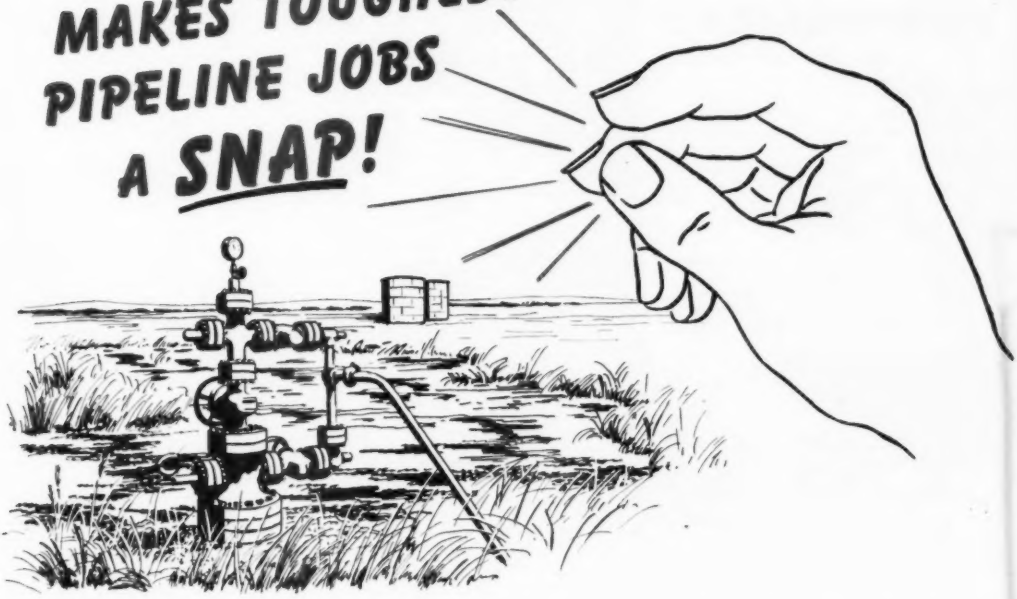

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dollar and selling them to national commercial interests for 3.35 bolivars to the dollar. "This profit," he says, "is in the nature of a hidden tax on oil production. In the case of local coffee and cocoa producers, the Banco Central pays 4.25 bolivars to the dollar. Thus, in a sense, oil production is called upon to subsidize the production of coffee and cocoa."

Apart from the government's policy of linking a refinery obligation to the granting of new areas for oil development and the "50-50" tax theory, the 1943 petroleum law of Venezuela, Pogue says, "appears to be generally acceptable and affords a reasonably sound working basis for the economic development of the petroleum resources."

In his discussion of the market for Venezuelan oil, Pogue points out that nearly 99 per cent of the country's output is exported and that in recent years customers have been easy to find. However, the Middle East, with reserves several times those of Venezuela and the lowest producing costs in the world, will gradually supplant Venezuela as the source of oil for Europe, leaving Venezuelan exports to the Western Hemisphere. "Much will depend," Pogue continues, "upon whether the country maintains a competitive status, or permits itself to become a marginal source of supply subject to the second choice of consumers.

The geographical position of Venezuela favors a large export trade in oil. For shipment to Europe, transportation costs from Venezuela are only about half those from the Middle East. Despite this, the lower producing costs of Middle East oil are allowing this production to displace Venezuelan oil in the European market, Pogue says.

Consumer Controls Policies

"The ultimate consumer of oil produced in Venezuela resides for the most part outside the boundaries of the state and beyond its control," Pogue says. "The consumer is interested in only two things: an ample supply and a reasonable price. . . . It may be thought that the oil companies which convey Venezuelan oil to these distant consumers may exercise some choice between alternate sources of supply, and so they doubtless can to a limited degree and for a limited period; but these companies are inexorably forced by competition to cater to the consumer else they become derelict to the rules which control their existence."

Outlining the basic facts on the Venezuelan oil industry, Pogue said reserves are now about 9,000,000,000 bbl. with production to date of about 4,500,000,000 bbl. Its resources are sufficient, he says, to "support a large oil activity into the next century."

Consumption this year is expected to average about 1,200,000 bbl. daily against the record 1,339,000 bbl. daily in 1948. In the aggregate, the Venezuelan oil companies have invested more than $2,000,000,000 with capital expenditures in the last 6 years alone totaling $1,280,000,000. For the 6-year period, the oil industry in Venezuela showed "accounting profits" of $971,000,000, but $527,000,000 or 54 per cent, were reinvested in the business. Also, if the $971,000,000 is recomputed in terms of prewar dollars, the total shrinks to $568,000,000, a contraction of 42 per cent.

International

French Refineries Agree To Exchange of Products

An agreement providing for exchange use of refining facilities as required has been concluded recently by Standard Francaise des Petroles and Cie. Francaise des Raffinages.

An oil-company official in Paris said under the agreement Standard would supply needs of Cie. Francaise in northern France, and Cie. Francaise would supply Standard in southern France. He said Standard would be able to get up to 25 per cent of its requirements in basic refined products from the La Merde refinery of Cie. Francaise in southern France.

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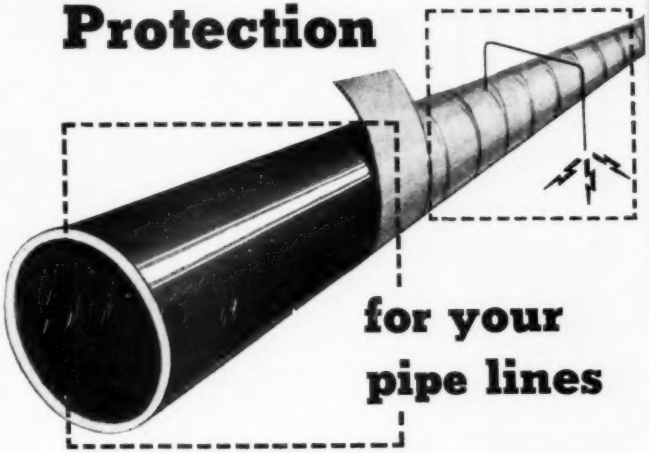

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Romanian Oil Men Put On Trial for Sabotage

TRIAL of a group of "saboteurs" charged with having attempted to defraud the Romanian oil company "Creditul Minier" opened in Bucharest late last month, according to reports in Washington.

Information so far received does not state the disposition of the case, although, in the light of similar trials in other iron-curtain countries, there is little chance of the defendants being found innocent.

According to reports released through the Romanian Legation the defendants were Anton Dumitriu, former general manager; Mihail Artareanu, former general director, and Etion Udrea, solicitor, of Creditul Minier; Rady Xenopol, industrialist; and George Litman, former owner of the Sinaia Casino.

This group, together with a man identified only as Soneriu, head of the Paris branch of Creditul Minier, were charged with having set up three dummy companies in Lichtenstein which, by fictitious deals between themselves and with the Romanian oil company, sought to defraud Romania of 1,950,500 Swiss francs. The alleged plot was hatched early in 1947 but was not exposed until this spring.

According to the indictment, as reported by the legation, "while the working people of Romania were exerting all their efforts to overcome the difficulties resulting from the war and the drought, a clique of representatives of big capitalists organized acts of sabotage and treason against the national interests of the country with a view of disorganizing its economic life, to impede any progress, and to strike a blow against the system of peoples' democracy. Utilizing their positions to undermine the country's economy, they hoped to withdraw huge sums from large industrial enterprises and to set up abroad a base, financially and materially sound, whence to engage in acts of treason against the Romanian peoples' democracy. In order to attain this, these agents of the bourgeoisie and landowners engaged in all sorts of maneuvers, forgeries, and frauds.

"And the oil industry, one of the most important branches of Romania's economy, was one of the centers they concentrated upon, for it gave them the possibility of establishing contact abroad. The prior object of these defrauders and saboteurs was the oil company 'Creditul Minier,' which had subsidiary branches in other countries."

After outlining the various allegedly illegal transactions, and not forgetting to expose the "life of debauchery" of the defendants while abroad with the money they had accumulated by defrauding the oil company, the prosecutor asked the "severest penalty" be passed on the accused.

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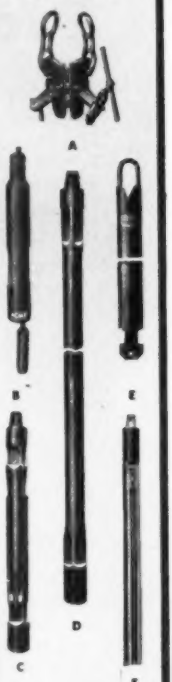

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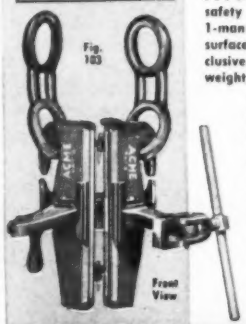

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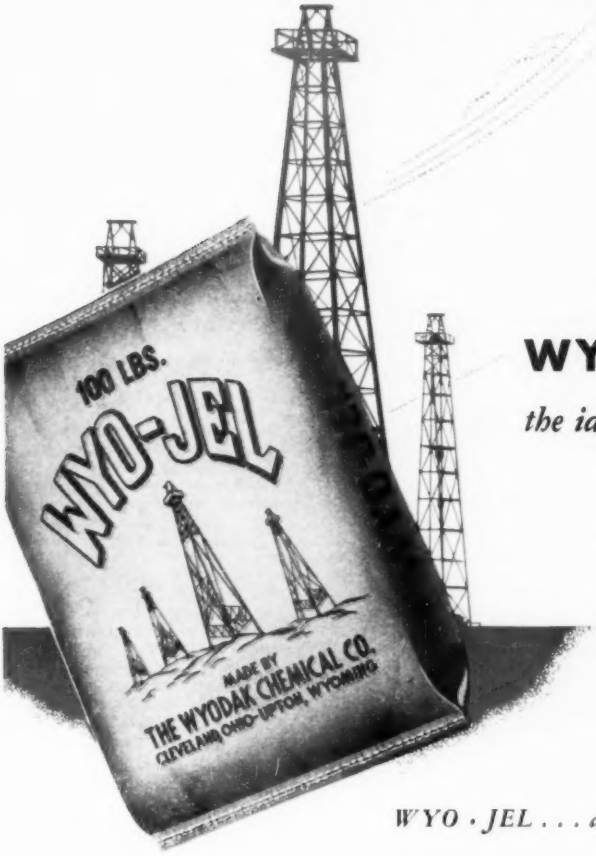
Two New Refineries Are Projected for Germany

Reports from Germany last week said German oil companies have projected the construction of two new refineries, one in the Emsland area and the other on the Lower Elbe.

Gewerkschaft Elwerath and Wintershall, A.G., propose to build a plant with a capacity of about 7,500 bbl. daily at Lingen on the Dortmund-Ems Canal. Deutsche Erdoel, A.G., producer in Holstein and Hanover, advanced another 7,500-bbl.-daily plant at Stadersand on the Lower Elbe River.

Neither project has received the sanction of the Allied governing authorities. There are now 26 refineries considered operable in the Western Zones with a potential total capacity of about 54,000 bbl. daily. Western Germany consumption as indicated by allocations is expected to be about 49,000 bbl. daily this year.



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Houston Firm Will Work On Japanese Refineries

Thomas S. Bryan, president of the Houston engineering and construction firm of Thomas Bryan & Associates, Inc., has announced that his company has entered into a working agreement with Nippon Kihatsuyu Kabushiki Kaisha (Japan Gasoline Co., Ltd.) to collaborate in the engineering design and reconstruction of petroleum refining and chemical processing plants in Japan.

Bryan quoted Masao Saneyoshi, president of the Japanese company, as reporting considerable progress in negotiations between the Supreme Commander, Allied Powers, and representatives of American and Japanese firms aimed at permitting the reopening of Japan's refining industry to use imported crude and possibly to export refined products.

Saneyoshi reported that such names as Nippon Oil Co. and California Texas Oil Co., Ltd., have been linked in current negotiations, and among others mentioned are Showa Oil Co. and the Shell interests, Toa Fuel Co. and Standard-Vacuum Oil Co., and Mitsubishi Oil Co. and Tide Water Associated Oil Co.

The manager of Bryan's chemical and petroleum division, A. C. Atwater, spent considerable time in Japan prior to the war.

Getty Purchases Dutch Holdings in Tide Water

Pacific Western Oil Corp. is reported to have acquired about 128,000 shares of additional stock in Tide Water Associated Oil Co. as a result of its purchase offer to Dutch holders which expired May 20.

With these purchases, the J. Paul Getty interests have increased their holdings in Tide Water to about 35 per cent of the total outstanding *(The Oil and Gas Journal, May 19, page 175)*.

U. S. Protests British-Argentine Trade Treaty

The United States Government has made an official protest to Great Britain against the recently concluded 5-year British-Argentine trade agreement which has virtually excluded American-produced oil from this South American market.

The United States protest was on the grounds that the agreement would lead to discrimination and that it ran counter principle of competitive trade, an objective which has been subscribed to by both United States and Britain.

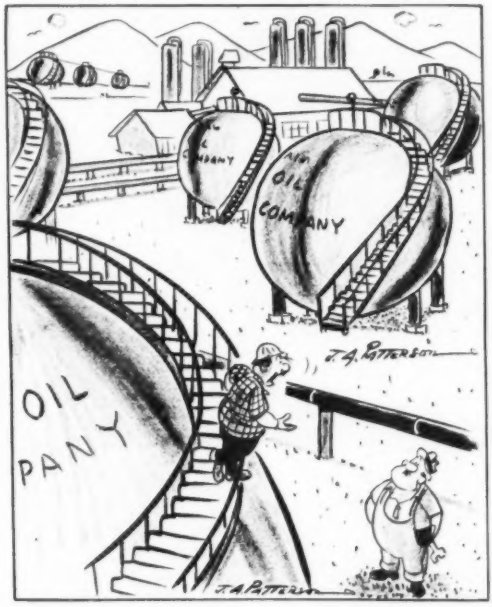
The British-Argentine agreement provides that Britain will supply Argentina some 100,000 bbl. daily of fuel oil and other petroleum as well as manufactured goods to balance Argentine sales of meat and other raw materials to Britain *(The Oil and Gas Journal, June 9, page 144)*.

Germans Balk at Junking Synthetic Fuels Plants

Allied preparations to dismantle synthetic oil plants in the German Ruhr have met strong opposition in Germany.

German workers turned away British dismantling crews at four synthetic plants last week, and British authorities notified the Germans their resistance must cease. In London, the Foreign Office in a statement said the plants were built up during the war, played no part in the normal German economy, and that opposition to the dismantling is regarded as opposition to prohibition of their use.

The plan to dismantle most of the facilities was taken in connection with the Allied agreement permitting the establishment of a German government *(The Oil and Gas Journal, April 21, page 122)*.



THE OIL AND GAS JOURNAL

"—and when she said, you don't have to climb upstairs everyday, like in her housework—brother that's when I blew up!"

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Feature of the Week
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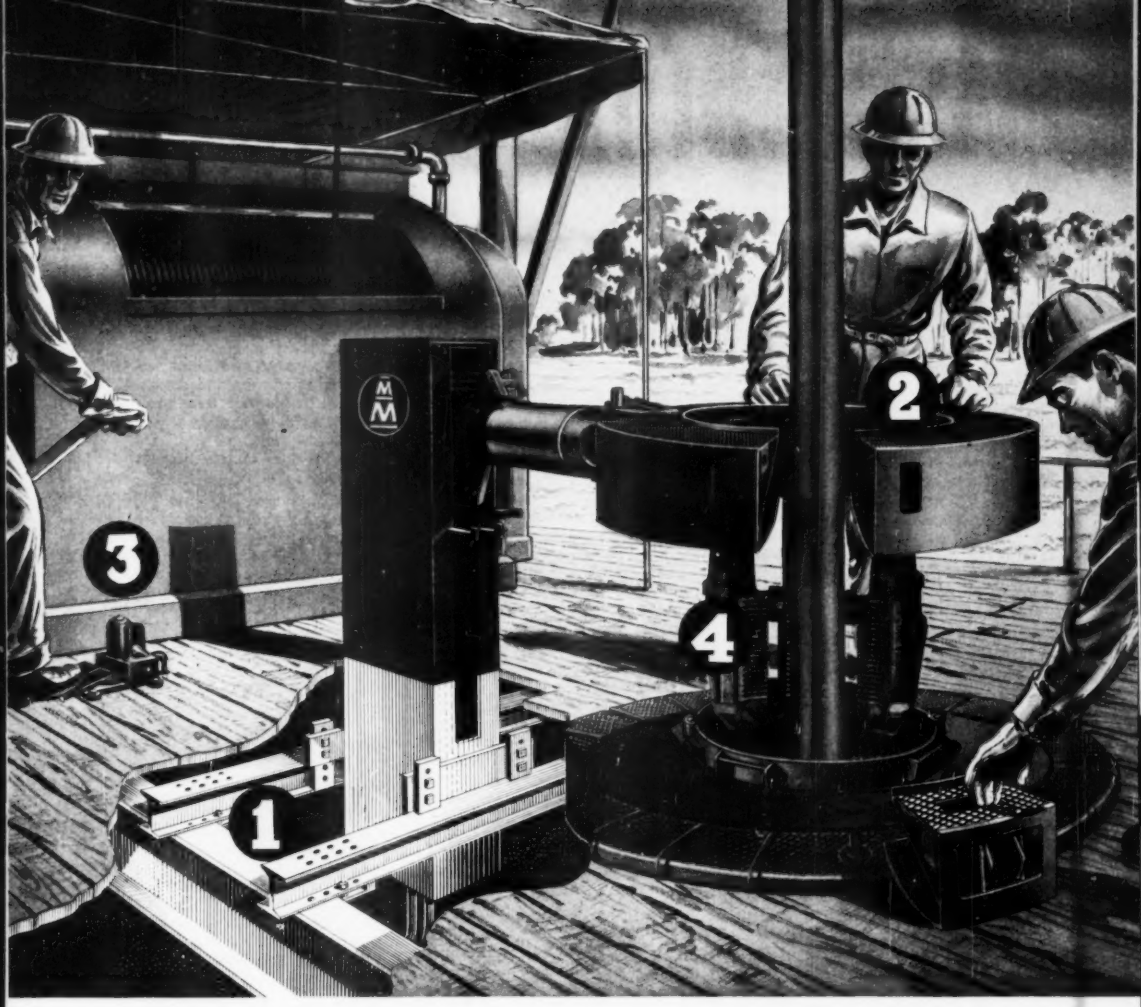

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WASHINGTON WATCHING

BY BERTRAM F. LINZ

No Action Needed

WASHINGTON.—The House interstate commerce committee has made a survey of the world oil situation and has found it to be such that no legislation dealing with any phase of the domestic problem is called for this year.

Something more than a year ago the committee made a thorough study of the conditions then prevailing and found a world-wide shortage, with stiff restrictions on the exportation from this country of both petroleum and steel. The committee, however, was unable to come up with any remedy for the situation and depended upon the oil industry to meet the emergency by the expansion programs then under way.

That the committee's confidence in the industry was well founded was demonstrated only a few months later, when it was announced the situation was under control, and the supply situation since has steadily improved until now there is excess production availability in this country.

This was brought out in a series of executive sessions at which the committee questioned government officials regarding various phases of the situation. The committee has gone into the shipments of steel for Saudi Arabia, the domestic supply, military supplies, and world availability. The testimony given the committee has not been printed and probably will not be, but a spokesman said it showed a picture of easy supply throughout the world, adequate provision to meet military needs, and an excess of supply in this country which might, if materially increased, itself present a problem.

There is a possibility that the committee may wish to round out its studies with a few public hearings at which company officials can give their views on the outlook for the future, but there is no intention of attempting this year to secure the enactment of any legislation dealing with oil or oil policy.

Sugar Daddy

FIFTY industries can thank the beet-sugar producers of Wyoming for getting congressional action on basing-point legislation.

That Wyoming Senator Joseph C. O'Mahoney, one of the most sincere antimonopolists in Congress, should sponsor the legislation legalizing delivered prices and freight absorption was remarkable in itself, but it was more remarkable when he took the long walk from Senate office building to House office building to defend his measure before a House judiciary subcommittee.

But back of O'Mahoney's great interest in the matter was the plight of the beet-sugar industry of his state. A couple of more sugar refineries advised the senator they would be forced to close down unless the Federal Trade Commission's attack on basing points was halted, sugar-beet growers reported they would be left with crops on their hands of which they could not dispose, and development of a big deposit of trona, from which soda ash is made, on which $1,000,000 already has been spent, would be stopped.

With Wyoming thus facing tremendous losses, the realities of the situation overshadowed the ideal of a catch-as-catch-can economy, and it became apparent there must be some virtues to the basing-point system if it can keep in operation large industries which could not exist without it. O'Mahoney isn't up for reelection until 1952, but that year is also the year of the national conventions at which Democrats and Republicans will pick their choices for the next administration, among them a Democratic candidate for vice president which is a job at which the Wyoming senator is reported to have cast a wistful eye.

O'Mahoney is strongly and sincerely opposed to monopoly in any form, but he has practical sense and has never sacrificed reality to achieve unworkable philosophy.

Survey for Synthetics

CONGRESS isn't going to enact any legislation this year to get the synthetic liquid-fuels industry started on a commercial basis, but the Army Engineers are going ahead, nevertheless, on the request of the Interior Department to determine suitable general areas for the production of synthetic fuels of various types.

The Army already has spent some money for a sample survey to be used as the pattern for a comprehensive study and, all told, will expend close to $1,500,000 in mapping out suitable areas for the construction of plants in Alaska and in all states except New England, New Jersey, Delaware, Minnesota, South Carolina, and Wisconsin.

No effort will be made to select specific sites for plants or to determine the total reserves of coal, shale, or other materials, but the survey will map out general areas in which there are raw materials in sufficient quantity and quality and adequate water supplies, power, transportation, labor, housing, and markets.

The survey in Alaska will be limited to the coal deposits south of the Arctic Circle between the 142d and 152d meridians, but in the states coal, oil shale, natural gas, and oil-impregnated strippable deposits will be studied.

The 11 states not included in the survey have no known deposits of these materials, but if any of them should be discovered in substantial quantities in any of those states during the period of the survey, consideration will be given to its inclusion. The information will be made available to any private enterprise seeking to get into the synthetic-fuels industry and looking for a place to start.

ERP the Goat

EUROPEAN Recovery Program funds for the coming fiscal year appear definitely slated for a sharp cut by the Senate, even though that action may cost the Government the services of Economic Cooperation Administrator Paul G. Hoffman.

Fears of deficit financing, frayed congressional tempers, and the friction between Congress and the White House and between Congress and the government departments all enter into a situation where, at the moment, the ECA appropriation appears to be the goat.

In stormy sessions of the Senate appropriations committee last week, Hoffman, doggedly fighting for the funds he thinks are necessary to carry the Marshall Plan on, said he would resign if he felt he could not do a good job, and Committee Chairman Kenneth McKeller of Tennessee, charging that Hoffman was making a threat to force Congress to give him what he wanted, shouted that "the sooner you resign, the better it will be for the United States."

Hoffman received far more support from Republican members of the committee than from the Democrats, several of whom expressed confidence that the ECA fund would be heavily cut. The administration is asking for $3,568,470,000 for the first 10½ months of the fiscal year which begins July 1, but the indications are the Senate will require that amount to be spread over the entire year.

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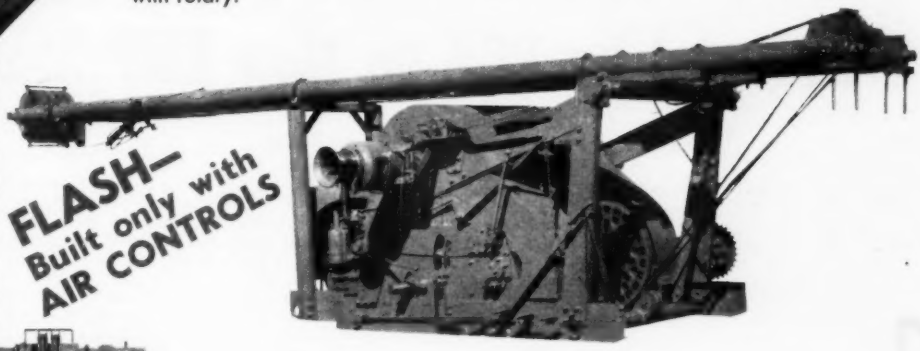

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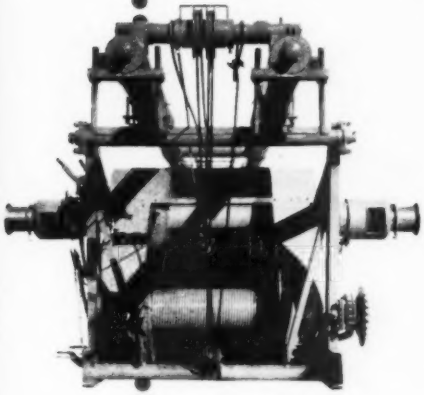

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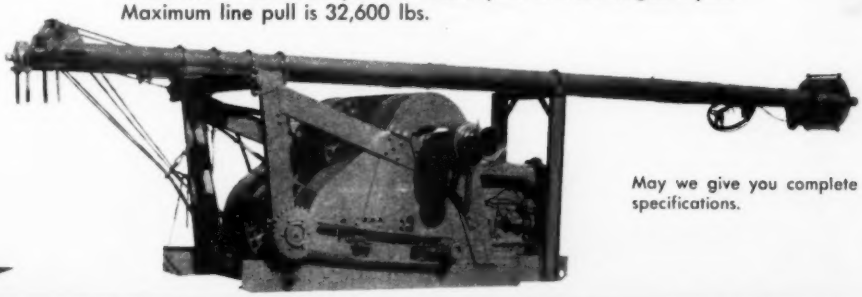

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Estimate of Europe's Oil Imports Reduced by ECA in New ERP Study

by Bertram F. Linz

WASHINGTON.—Estimates of the Economic Cooperation Administration of the petroleum needs of the Marshall plan countries during the year beginning July 1 have been cut back 1,000,000 bbl. since March, it was disclosed this week.

The ECA made public a commodity study on petroleum and equipment prepared for submission to the House appropriations committee when it considered the ECA appropriation last March, together with a revision of the figures which showed it is now anticipated the participating countries will require 48,700,000 tons of petroleum products during the next 12 months. This would be 12,600,000 tons less than estimated in July 1947, by the Committee of European Economic Cooperation in Paris, but 3,700,000 tons over the estimate of the U. S. agencies in February 1948, and the study commented that "the consumption levels now estimated by the participating countries are much more realistic than the previous CEEC estimates and represent a determined effort by the countries to achieve economic recovery within the framework of oil availability and with the maximum economy in expenditures."

Note: Figures in metric tons per year may be roughly converted into U. S. barrels per day by dividing by 50.

To supply this petroleum, ECA estimates that 52,700,000 tons of crude and refined products—a little more than 1,000,000 bbl. a day—will have to be imported by the Marshall plan countries, of which 21,800,000 tons—nearly 436,000 bbl. daily—valued at $562,500,000 on the basis of November 1948 prices, must be obtained from dollar sources. This, it was pointed out, is nearly $100,000,000 less than the estimates of $658,500,000 originally submitted by the participating countries.

Europe will reach a new milestone in the 1950 year, ECA said, when for the first time in its oil history crude imports are scheduled at more than half of total oil imports. Before the war, crude accounted for about one-third of the receipts.

The study made it clear that ECA is attempting to hold the Marshall plan countries down to attainable targets. Looking forward to 1953, when the European Recovery Program will terminate, it is estimated the participating countries will have increased their consumption to a total of 62,400,000 tons from a prewar level of

TABLE 1—VALUE OF PETROLEUM EQUIPMENT TO BE PURCHASED DURING THE CURRENT AND NEXT FISCAL YEARS AS ESTIMATED BY PARTICIPATING COUNTRIES UNDER ERP

(In thousands of dollars)

Type of equipment—	Fiscal 1950			Fiscal 1949		
	Dollar sources	Nondollar sources	Total	Dollar sources	Nondollar sources	Total
Drilling	53,744	51,694	105,438	38,906	30,955	69,861
Well casing	13,800	17,122	30,922	17,400	16,800	34,200
Refining	124,127	189,129	313,256	84,877	116,414	201,291
Transportation and distribution	(*)	(*)	(*)	10,957	71,923	82,880
Storage	15,260	81,003	96,263	9,104	62,287	71,391
Pipe lines	2,645	40,850	43,495	25	19,800	19,825
Miscellaneous	(*)	(*)	(*)	31,271	62,429	93,700
Undistributed	2,000	1,000	†3,000	0	0	0
Total	211,576	380,798	592,374	192,540	380,608	573,148

*Not included in national submissions. †These figures represent the program for French overseas territories for which no distribution by type of equipment is available.

Note.—For the purpose of this table, estimates have been used as prepared by the participating countries; they include all equipment required by American companies operating in the participating countries and operating in joint ventures with British companies overseas.

TABLE 2—ESTIMATES OF IMPORTS OF CRUDE AND PETROLEUM PRODUCTS UNDER ERP AS GIVEN BY THE ECONOMIC COOPERATION ADMINISTRATION, THE ORGANIZATION FOR EUROPEAN ECONOMIC COOPERATION, AND THE PARTICIPATING COUNTRIES

(In thousands of metric tons)

	Fiscal 1950						Fiscal 1949					
	Dollar oil*		Nondollar oil		Total		Dollar oil*		Nondollar oil		Total	
	ECA	Country	ECA	Country	ECA	Country	ECA	OEEC	ECA	OEEC	ECA	OEEC
Austria	†23	†23	†111	†111	134	134	28	28	84	84	112	112
Belgium—Luxemburg	1,104	†1,204	†1,076	†1,076	2,180	2,280	1,096	1,246	969	969	2,065	2,215
Denmark	735	735	795	795	1,530	1,530	750	815	628	628	1,378	1,443
France	6,175	6,210	5,295	5,295	11,470	11,505	4,480	4,980	4,610	4,610	9,090	9,590
Germany—Bizone	1,000	1,000	550	550	†1,550	†1,550	1,300	1,308	340	340	1,640	1,648
Germany—French zone	273	273	0	0	273	273	174	193	14	14	188	207
Greece	427	427	431	431	858	858	366	407	446	446	812	853
Iceland	70	70	100	100	170	170	75	95	76	76	151	171
Ireland	221	221	345	345	566	566	208	208	332	332	540	540
Italy and Trieste	1,992	2,579	†2,886	†2,886	4,878	5,465	2,325	2,576	2,056	2,056	4,381	4,632
Netherlands	733	1,120	2,810	2,810	3,543	3,930	645	701	2,106	2,106	2,751	2,807
Norway	438	438	1,164	1,164	1,602	1,602	485	485	1,013	1,013	1,498	1,498
Portugal	489	514	234	234	723	748	449	449	226	226	675	675
Sweden	1,493	1,493	1,289	1,289	2,782	2,782	1,361	1,880	1,766	1,247	3,127	3,127
Switzerland	562	562	623	623	1,185	1,185	607	607	617	617	1,224	1,224
Turkey	313	535	205	205	518	740	360	360	183	183	543	543
United Kingdom	5,738	5,738	13,038	13,038	18,776	18,776	5,848	6,588	12,641	11,901	18,489	18,489
Total	21,786	23,142	30,952	30,952	52,738	54,094	20,557	22,926	28,107	26,848	48,664	49,774

*Estimates include both the ECA and non-ECA financed portions of dollar oil. †Estimates shown here are the latest revisions made by the participating countries and they vary slightly from those used in the balance of payment estimates. ‡Total imports, tentatively estimated by U. S. Army and broken down into dollar and nondollar imports by ECA, are probably subject to further revision. It is now believed that JEIA will purchase an additional 300,000 tons of crude oil and 220,000 tons of gas and diesel oil from sterling sources.

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30,100,000 tons and a 1947 consumption of 38,400,000 tons, but this will still be 6,300,000 tons, or nearly 10 per cent, below the original CEEC estimate of 68,700,000 tons.

ECA has accepted the estimates of the Organization for European Economic Cooperation that the fiscal 1950 requirements of crude will be 228,000 bbl. daily of dollar and 315,000 bbl. of nondollar oil, a total of 543,000 bbl. daily, but has cut the estimates of dollar refined products from 235,000 to 208,000 bbl. daily. Nondollar product requirements of 304,000 bbl. daily were accepted without change. (See Table 2.)

It is estimated that during the coming year shipments of crude and products will run at levels of 100,000 bbl. daily from the United States, 380,000 bbl. from other Western Hemisphere sources, and 560,000 bbl. from the Middle East, but that by 1953 this balance will shift to 40,000 bbl. daily from the United States, 240,000 bbl. from other Western Hemisphere sources, and 960,000 bbl. from the Middle East, and shipments from the United States will be down to about 27 per cent of what they were in 1947.

Refinery Plans Pending

Whether the Marshall plan can achieve these goals, however, will depend largely upon the development of its refining industry, which involves a situation the ECA has not yet been able to iron out satisfactorily, the study showed.

The petroleum-equipment problem has been divided into two parts—the plan for expansion of refining facilities within the participating countries by all companies and outside Europe by companies of the participating countries; and the plan for increasing crude production outside Europe by companies of the participating countries, mainly the United Kingdom, the Netherlands and, to a lesser extent, France.

So far, ECA has financed only a small volume of equipment. The participating countries estimated their equipment needs for 1950, from all sources, at $592,000,000, of which they expected to obtain $211,000,000 worth from the United States, (see Table 1), but indications are that ECA will scale these estimates of needs from the United States down to something more than $100,000,000.

The OEEC estimates indicate that refining capacity will increase from 70,100,000 metric tons in 1947 to 137,700,000 tons in 1953, of which 65,700,000 tons will be in Europe and 72,000,000 tons overseas, and according to present plans the total capacity will increase to 153,000,000 tons by fiscal 1955.

"Without going into a country-by-country discussion, it should be pointed out here that the over-all program which would result from

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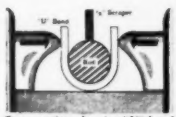
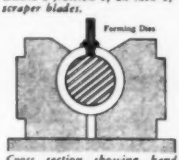


Cross section showing "U" band being die-formed around rod to within a fraction of an inch of scraper blades.



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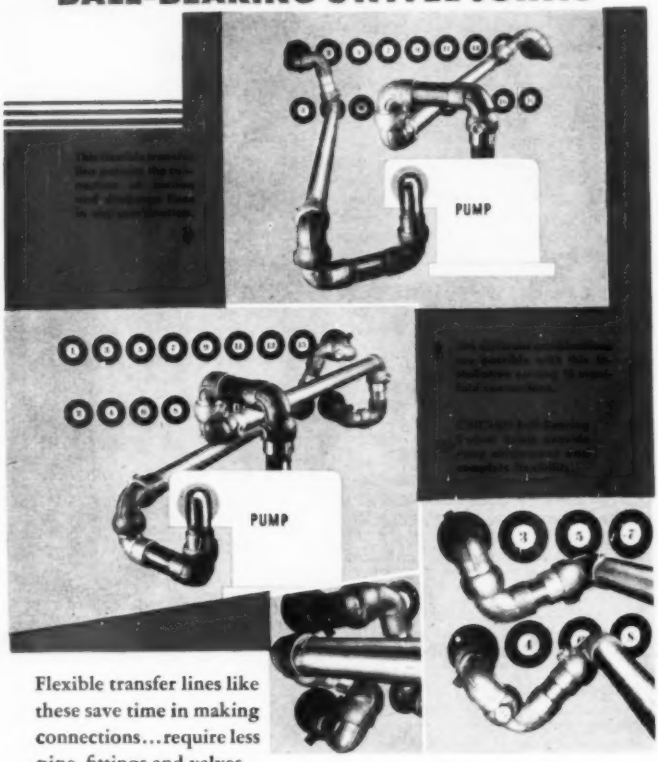

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adding together the individual country submissions appears to be too high," the study said. "It must be emphasized strongly that none but economically sound projects, judged separately and in combination, should be included in the long-term program. In this connection it should be pointed out that some of the countries by fiscal 1953 expect to supply not only their total domestic needs from the output of domestic refineries but also to export refined products to neighboring, or even to more distant, countries. At the same time, such neighboring countries appear to be making plans to cover their own needs and frequently also to supply an exportable surplus from domestic refinery production.

"As a result, when the individual country plans are added together, the total European import-refining-consumption-export picture for fiscal 1953 does not represent a well-balanced oil economy. Based on these plans, Europe in fiscal 1953 would have available 59,600,000 tons of crude oil, 57,500,000 from imports plus 2,100,000 from domestic production. In addition, the country programs provide for gross imports of 18,600,000 tons of refined products and, at the same time, for gross exports of more than 10,000,000 tons of finished products.

Economies Not Balanced

"The above estimated imports and exports of refined products include the quantities moving in intra-European trade. As the product composition of the planned output country by country in many instances may be out of line with the product composition of demand, there will probably be country-by-country surpluses in some products and deficiencies in others. Some of these surpluses can obviously be balanced against some of the deficiencies, but the estimates suggest that Europe as a whole will still be a net importer of some products and a net exporter of others."

A lack of balance in the refining and import-export picture, however, is not the only disturbing factor in the unadjusted long-term programs of the various European countries, the ECA said. Another important consideration is the likelihood of a sizable volume of refined products available for Europe in 1953 from refineries outside the continent. If refining capacity in the Western Hemisphere and Middle and Far East is increased as presently planned, the surplus probably would be near the level of imports of products into Europe during the present or coming fiscal year.

The program for refining expansion outside Europe by companies of the participating countries calls for an increase from 69,700,000 tons at the end of 1947 to 72,000,000 tons in 1953, with the major expansion in the Eastern Hemisphere.

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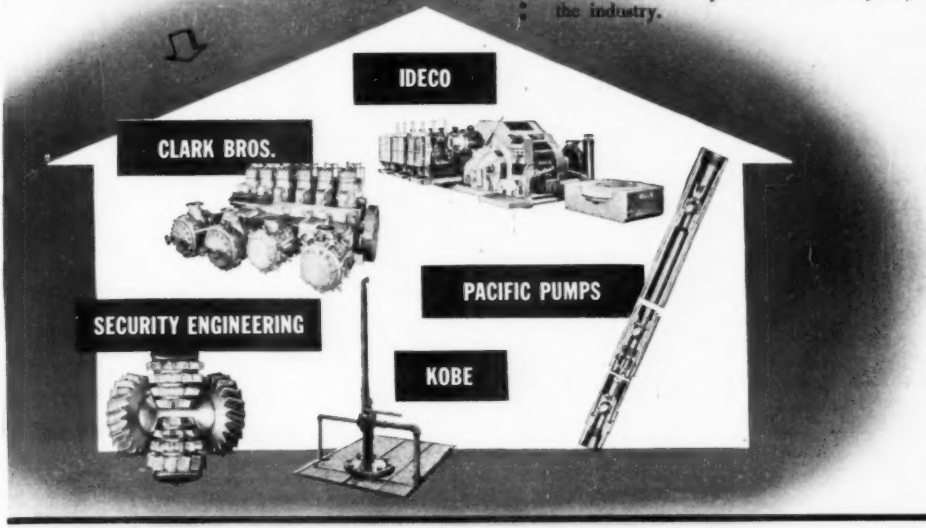

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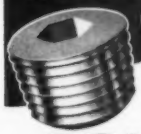

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expansion, the European countries plan to increase their crude production from 55,600,000 tons in 1947 to 115,700,000 tons by 1953, and the proposed Middle East program raises questions of the availability of transportation facilities and the necessity of a choice between pipe lines and tankers.

"The problem of the transportation of Middle East crude oil is involved and complicated," the report commented. "The rise in production in that area and the increased dependence of other world areas on the Middle East for supplies, trends which will be accelerated during the remainder of the Marshall plan period, have occurred so rapidly that there is no general agreement even now on the best method of transportation. In addition, very complex economic, political, and strategic considerations must be weighed in any evaluation of alternative transportation facilities.

"Whether or not sufficient tankers would be available to move all oil needed from the Middle East if there should be delays in any one of the pipe-line projects is a question that cannot be answered easily. A reasonable conclusion is that tanker facilities could be provided for at least a substantial part of requirements if there were indications at an early enough time that such an expanded world tanker fleet would find employment in the future and if overage tankers were kept in service.

"The income that is expected from the increased sales of crude oil as well as refined products will constitute an important element in the future balance of payments of some participating countries. It must, however, be realized that, if such expansion greatly exceeds the absorptive capacity of the markets of the companies of the participating countries, it will lead to a displacement of dollar oil, especially in soft-currency markets where nondollar oil enjoys a competitive advantage as a result of the dollar shortage of the importing countries. Such displaced dollar oil may, therefore, try to capture an increased share of the strong currency markets. As a result, nondollar oil may find itself left with the major supply responsibility for soft-currency markets and lose income in hard-currency markets.

"Under such conditions, the overall recovery goal of the oil expansion program would not be achieved because the dollar savings of oil-importing, soft-currency countries would probably be counterbalanced by the loss of dollar income by the oil-supplying countries resulting from a reduction in their sales to hard-currency markets. However, a well-conceived program of crude-oil development by companies of the participating countries may be one of the most effective means of self-help available to those countries, particularly the United Kingdom."

Holman Says Imports Not Excessive Now

(Continued from page 70)

the future, Jersey's investments in the Middle East to date have not been made with the thought that this oil would be required for importation into the United States. Our Middle East investments have been made to protect our very large business in the Eastern Hemisphere which, in 1948, was about 300,000 bbl. daily.

"I don't want to be misunderstood. This does not mean that no Middle East oil would move into the United States at any time. Development of productive capacity must and, no doubt, will take place concurrently with or slightly in advance of the completion of Eastern Hemisphere refineries. As a result, there will be available from time to time and in varying amounts productive capacity which could be used for supplying the United States market. However, such volumes could hardly be called floods of oil. The important question is: Will capital be attracted to the Middle East to provide for a permanent oil supply for the United States? We doubt it."

There are other factors, however, which would prevent a flood of

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foreign oil, Holman said, and an increase in Middle East imports over present levels in an amount equal to only 3 per cent of domestic production would encounter these bottlenecks:

1. Limitations on physical facilities for handling additional crude, such as pipe lines, docks, crude stabilizers, etc.

2. Such an increase in imports would require all available tankers to be pressed into service. It is doubtful if this added load could be handled by the world tanker fleet during the winter season of high tanker requirements, and new tanker construction now under way is no more than enough to take care of the normal increases in tanker requirements.

3. There is only limited refining capacity on the East Coast capable of processing the high-sulfur, low-octane Middle East crude.

4. Shipments to the Gulf Coast and West Coast would require far more tankers and therefore reduce considerably the amount which physically could be moved. In addition the transportation cost would be higher and competitive sale price lower at the Gulf Coast than on the East Coast.

"Our studies and knowledge of both foreign and domestic oil lead us, as a company, to the conclusion that fears of floods of foreign oil imports are unfounded in economics," Holman said in conclusion.

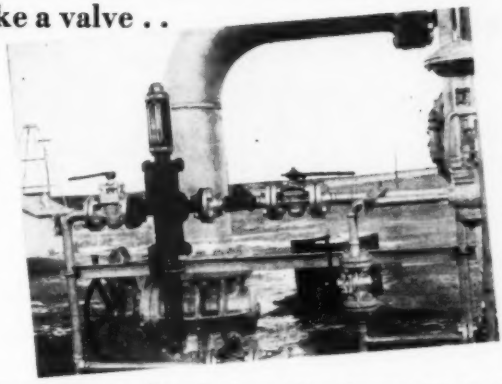
"Our company has a great stake in the domestic economy. Also we are always mindful of the paramount importance of our national security and the part oil plays therein. If something now unforeseen to us should actually take place in the future, which was detrimental to our national security or domestic economy, I would support every effort to see that it was corrected promptly and adequately. However, I cannot bring myself to recommend that legislation be introduced in Congress to deal with a supposition about the future when I feel that such supposition has no firm basis of fact. I really feel that the only thing the domestic producer has to fear is fear itself."

Use of Fluid Meters for Oil Measurement Denied

BATON ROUGE.—Union Oil Co. of California's application to permit use of fluid meters in lieu of lease tanks to measure oil production from Gimnick lease in the Gordon field of Beauregard Parish has been denied by the Conservation Commission.

Grounds of the refusal was that suitable means of insuring a proper check on individual lease production would not be afforded. The commission has heard a similar application of Shell Oil Co., Inc., for permission to use fluid meters on various leases in Iowa field, Calcasieu and Jefferson Davis parishes.

This flow meter "takes to" your pipe system like a valve . .



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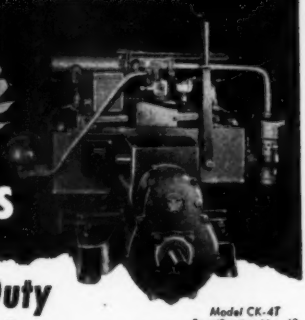

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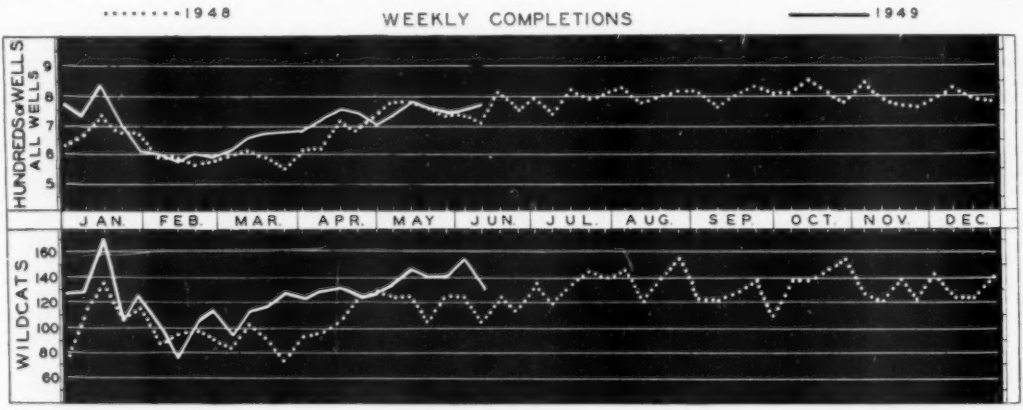
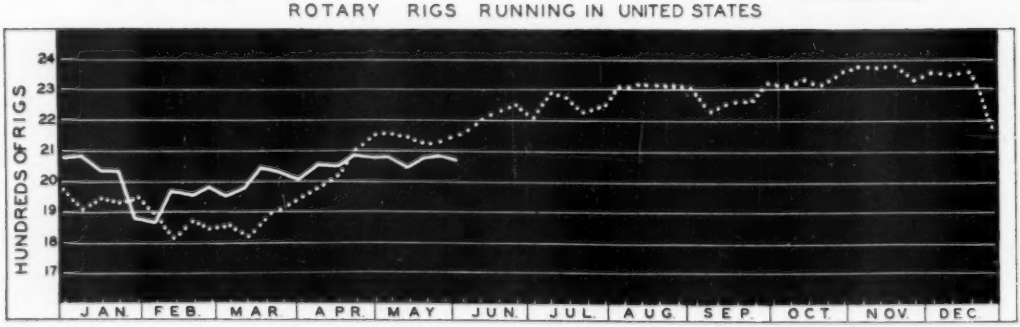
WEEKLY WELL COMPLETIONS . . . . WEEK ENDED JUNE 11, 1949

	Total of all wells					23 wk.		Wildcat completions and discoveries					Cumulative total, 1949				
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	19	9	0	*10	19,841	526	673	0	0	0	0	0	0	0	0	0	0
Pennsylvania	22	11	1	*10	42,320	747	1,147	0	0	0	0	0	0	0	1	1	2
West Virginia	8	2	6	0	23,866	216	331	0	0	0	0	0	0	0	5	6	11
Ohio	19	6	3	*10	29,790	472	550	0	0	0	0	0	1	0	2	18	21
Indiana	24	9	0	15	44,589	516	404	1	0	0	3	4	10	0	0	99	109
Kentucky	18	4	4	10	28,795	333	267	0	0	0	1	1	8	0	0	22	30
Illinois	60	33	0	27	147,128	964	864	1	0	0	7	8	19	0	1	162	182
Michigan	18	6	0	‡12	39,084	387	277	0	0	0	4	4	15	0	1	134	150
Kansas	64	31	6	27	216,381	1,289	1,222	2	0	1	6	9	24	0	3	164	191
Neb., Mo., Iowa	0	0	0	0	0	12	1	0	0	0	0	0	0	0	0	8	8
Oklahoma	85	37	8	†40	322,148	1,796	1,691	1	0	2	16	19	65	8	10	258	341
Texas	284	178	17	89	1,268,462	5,734	4,782	5	3	4	49	61	179	26	51	1,005	1,261
North Central (Dist. 7-B & 9)	78	46	0	32	273,235	1,840	1,481	1	0	0	11	12	82	0	8	387	477
West (Dist. 7-C & 8)	87	67	0	20	397,869	1,360	1,278	0	0	0	12	12	26	0	2	111	139
Panhandle (Dist. 10)	15	9	6	0	47,121	463	246	0	0	0	0	0	1	0	0	2	3
Eastern (Dist. 5, 6 & 6-P)	13	6	2	5	60,266	304	211	0	0	0	3	3	1	1	3	63	68
Gulf Coast (Dist. 2 & 3)	45	28	6	11	287,209	851	778	3	2	3	9	17	37	19	25	176	257
Southwest (Dist. 1 & 4)	46	22	3	21	202,762	916	788	1	1	1	14	17	32	6	13	266	317
Louisiana	45	26	6	13	196,246	868	879	1	0	0	6	7	23	8	2	90	123
Northern	30	20	5	5	77,926	449	578	0	0	0	2	2	1	1	0	37	39
Southern	15	6	1	8	118,320	419	301	1	0	0	4	5	22	7	2	53	84
Arkansas	5	3	0	2	20,906	123	123	0	0	0	2	2	2	0	0	27	29
Mississippi	6	4	0	2	43,865	161	172	0	0	0	1	1	4	0	1	46	51
Southeastern States	1	0	0	1	11,576	23	20	0	0	0	0	0	1	0	0	20	21
Montana	14	10	0	4	25,892	96	105	0	0	0	1	1	1	0	1	10	12
Wyoming	24	13	0	11	93,900	262	187	1	0	0	4	5	12	0	0	46	58
Colorado-Utah	§2	0	0	§2	5,758	58	108	0	0	0	§2	§2	1	0	0	24	25
New Mexico	10	9	0	1	31,945	241	259	0	0	0	1	1	6	0	0	23	29
California	48	42	0	6	224,831	1,170	1,248	0	0	0	6	6	21	0	2	196	219
Total United States	776	433	51	292	2,837,323	16,030	15,310	12	3	7	109	131	392	42	80	2,359	2,873
Total previous week	737	415	42	280	2,800,441	15,254	14,595	25	4	3	124	156	380	39	73	2,250	2,742
Total June 12, 1948	715	409	49	257	2,569,446			13	2	5	83	103	337	31	121	2,029	2,518

Service wells included: *10, ‡1, §4. §Incl. 1 Ariz. at 3,734 ft.





DAILY AVERAGE PRODUCTION FOR WEEK

	June 11 crude oil	B. of M. June demand	June 4 crude oil
Alabama	1,200	1,550	1,200
Arkansas	80,500	86,000	79,900
California	923,600	940,000	934,900
Colorado	64,500	65,000	66,200
Eastern	59,000	60,850	62,300
Florida	1,400	1,400	1,275
Illinois	176,600	165,000	176,400
Indiana	26,000	23,000	25,600
Kansas	270,600	300,000	289,250
Kentucky	24,400	21,000	24,300
Louisiana	508,600	487,000	505,475
North Louisiana	118,600		117,800
South Louisiana	390,000		387,675
Michigan	41,600	46,000	38,400
Mississippi	98,500	114,000	109,350
Montana	27,500	24,000	27,300
Nebraska	400	700	250
New Mexico	137,900	126,000	134,440
Oklahoma	405,750	405,000	425,050
Texas	1,908,000	2,210,000	1,897,975
Dist. 1 (Southwest)	26,095		25,925
Dist. 2 (Southwest)	118,925		118,825
Dist. 4 (Southwest)	185,750		185,150
Dist. 3 (Gulf Coast)	355,430		356,200
Dist. 5 (Eastern)	34,350		34,400
Dist. 6 (Eastern)	83,250		83,375
East Texas field	242,600		244,650
Dist. 7-C (West)	42,150		42,175
Dist. 8 (West)	529,200		525,325
Dist. 7-B (W. Central)	59,975		58,575
Dist. 9 (N. Central)	137,275		132,175
Dist. 10 (Panhandle)	93,000		91,200
Utah	500	500	500
Wyoming	124,200	123,000	124,900
Total United States	*4,880,750	5,200,000	4,924,965
Change from prev. week, down	44,215		

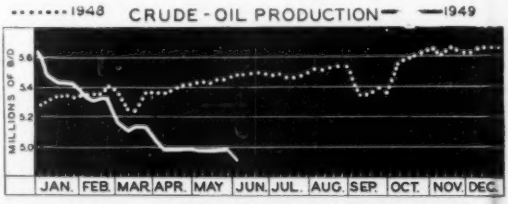
Total production January 1-June 11 †844,232,715 bbl.
Same period last year (crude plus cond.) 887,775,605 bbl.

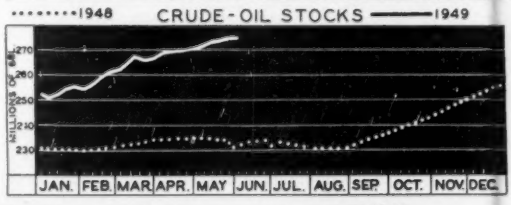
*Not including 80,215 bbl. condensate. †Including 13,674,755 bbl. condensate.

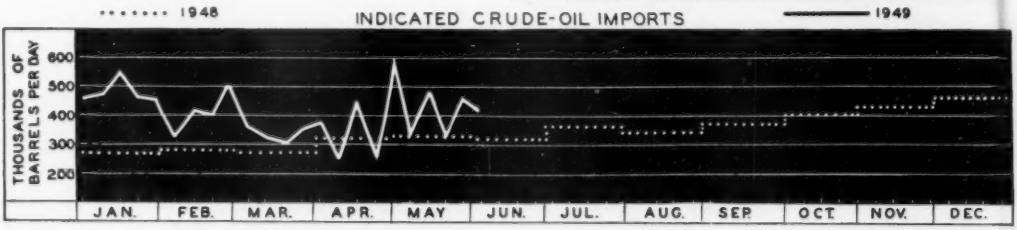
CRUDE STOCKS BY STATES OF ORIGIN

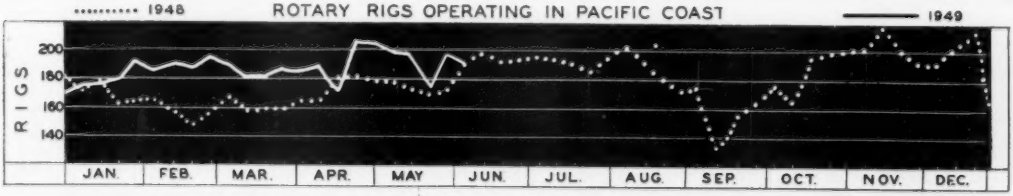
(Thousands of barrels)

State of origin—	June 4, 1949	May 28, 1949	June 5, 1948
Pennsylvania Grade	3,091	3,102	2,623
Other Appalachian	1,946	2,030	888
Ill., Ind., Mich.	14,345	14,374	10,141
Arkansas	3,089	2,970	2,955
Louisiana	14,846	15,210	12,207
North	3,168	3,260	3,012
Gulf	11,678	11,950	9,195
Mississipi	3,291	3,339	2,252
New Mexico	7,293	7,404	5,284
Oklahoma and Kansas	40,426	39,673	33,524
Texas	129,864	129,861	113,020
East Texas	17,967	17,874	16,397
West Texas	51,810	51,848	43,102
Texas Gulf	30,571	31,231	28,629
Other Texas	29,516	28,908	24,693
Rocky Mountain	13,706	13,693	9,255
California	34,950	35,276	30,130
Foreign	8,174	8,258	5,259
Total United States	275,021	275,190	227,538









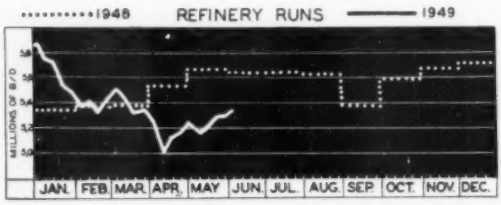
Refining Statistics

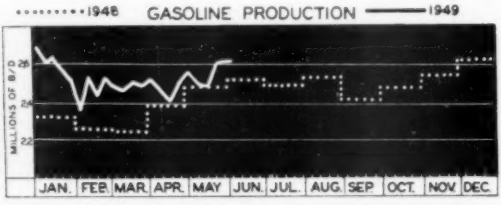
A.P.I. REFINERY REPORT, JUNE 4

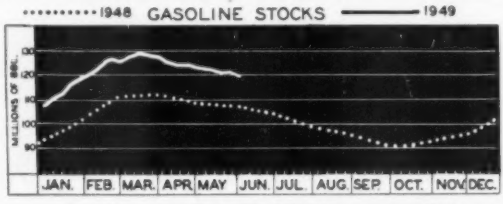
(Thousands of barrels)

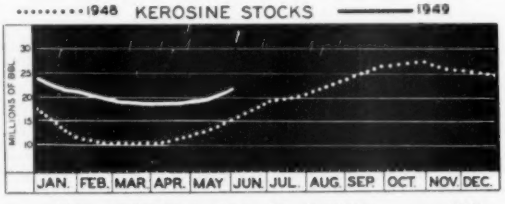
District—	Crude runs daily avg.	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, June 1948				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	752	319.7	28.7	155.0	173.1	28,525	9,764	20,368	10,476	898	321.9	51.6	177.6	220.4
Appalachian:														
District 1	101	44.9	3.9	12.3	10.4	2,609	414	707	527	104	43.1	7.8	13.3	12.3
District 2	57	30.3	2.1	2.6	8.1	1,206	123	215	306	59	31.7	1.9	5.5	12.4
Ind., Ill., Ky.	899	520.0	46.7	111.9	141.2	26,470	3,515	8,976	5,528	894	481.3	53.5	117.7	152.7
Okla., Kans., Mo.	437	231.4	19.9	86.7	55.4	11,781	1,249	4,255	2,471	469	235.5	22.2	87.6	77.2
Inland Texas	196	143.3	11.7	18.0	43.9	4,812	523	669	1,171	248	152.8	14.4	25.3	58.6
Texas Gulf Coast	1,291	608.0	71.6	205.7	230.6	16,274	2,813	9,098	7,537	1,406	614.3	99.3	309.0	265.4
La. Gulf Coast	402	205.3	35.7	92.9	39.9	5,020	1,955	3,342	2,118	428	182.7	45.7	89.5	75.3
N. La. and Ark.	82	32.6	5.7	12.7	17.4	2,288	513	1,085	240	85	28.9	7.7	14.4	18.8
Rocky Mountain:														
New Mexico	11	5.7		1.7	3.4	86	25	68	38	12	6.1	0.5	1.6	3.3
Other Rocky Mtn.	171	76.7	6.3	24.0	36.3	3,325	285	1,225	909	154	65.9	3.9	25.2	30.3
California	942	388.4	13.7	127.8	358.4	16,710	679	8,569	32,742	877	364.5	4.3	131.0	352.9
June 4, 1949‡	5,341	2,606.3	246.0	851.3	1,118.1	119,106	21,858	58,597	64,063	5,632	2,528.7	312.8	997.7	1,279.6
May 28, 1949	5,297	2,617.7	221.4	849.0	1,163.4	120,661	20,953	55,971	¶63,168					

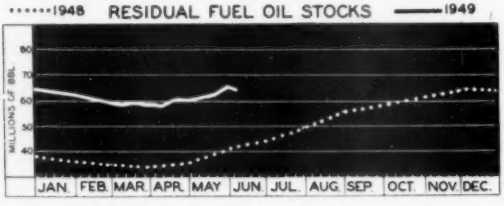
*At refineries including natural blended. †Finished and unfinished. ‡Comparable data for 1948 on new basis not available. ¶Revised.

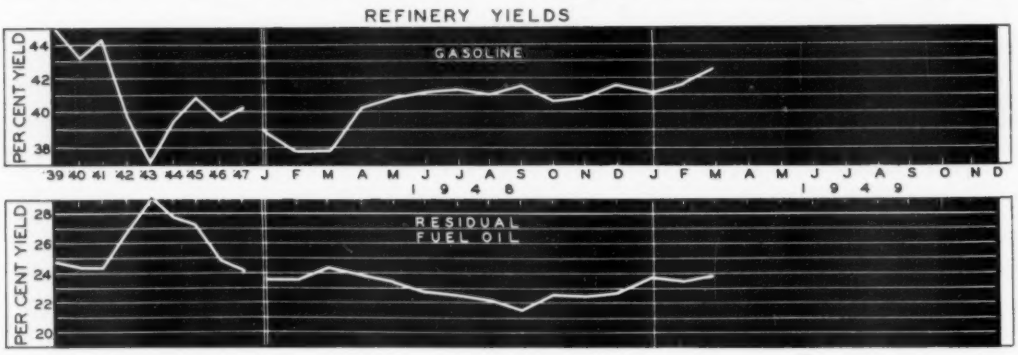











REFINERY YIELDS
GASOLINE
PER CENT YIELD
39 40 41 42 43 44 45 46 47 J F M A M J J A S O N D J F M A M J J A S O N D
1948
1949
RESIDUAL FUEL OIL
PER CENT YIELD

CRUDE PRICES GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.78			
19-19.9	1.85			
20-20.9	1.93	$2.25		$2.12
21-21.9	2.00	2.27		2.14
22-22.9	2.07	2.29		2.16
23-23.9	2.13	2.31		2.18
24-24.9	2.20	2.33	$2.56	2.20
25-25.9	2.26	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.27
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above

REFINERY demand for gasoline during the last weeks of May and the first part of June was about 6.7 per cent greater than in the same period last year but the pattern of movement differed somewhat from that of past years. The program in the past called for heavy additions to resellers' stocks in the last week of May in anticipation of increased gasoline consumption with the formal opening of vacation season. This produced a very high demand for the week before Decoration Day. This year refinery demand reached a peak for the week ended May 14 and declined slightly for the next 2 weeks with a stock reduction of only 136,000 bbl. during the week of May 28. Actual consumption for the week end of Decoration Day probably set a new record since many orders in the following week called for immediate shipment, resulting in a reported stock decline of 1,555,000 bbl. and a new high in refinery demand. All of this seems to indicate that resellers are trying to get along with smaller working stocks than in the past.

So far, the programs designed to protect resellers against summer declines in the price of No. 2 fuel oil have not resulted in any big flow of oil to reseller and consumer storage. Most suppliers expect some results by the end of this month, but for the week ended June 4 about 44 per cent of distillate production went to primary storage.

Mid-Continent markets changed very little during the past week. In the distillate group only diesel fuels remained active. Demand for pipeline grades of gasoline was strong.

Suppliers in the New York Harbor area report good gains in movement of contract gasoline but the spot market is still not showing strength.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of June 13, 1949. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 73-75 octane	9⅜-9⅞	11.25-12	9½-10
Premium gasoline, 78-80 octane	10⅜-11	12.25-13	10½-11
42-44 w.w. kerosine	8-8½	8-8.4	7.50-8
No. 2 straw fuel oil	6¾-7	6.85-7.4	6⅜-6½
No. 6 residual	$0.85-0.90	$1.60	$1.15-1.25

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5¼	4¾	5
Grade 18-55	6.3	5.7	6.0

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	11
750 vis., No. 3-4 neutral	14
2,000 No. 5-6 neutral	16-16.5

LUBRICATING OILS
Mid-Continent

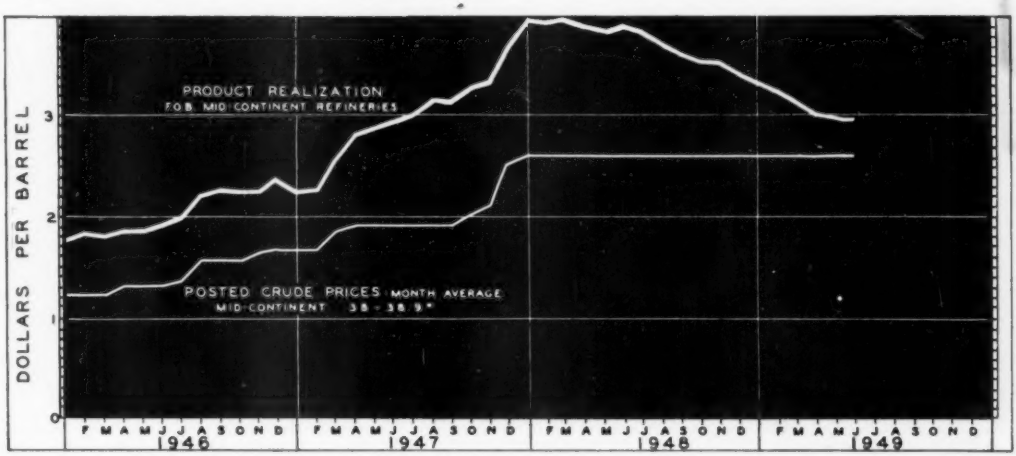
150-160 vis., D bright stock, 0-10 pp.	19
200 vis., No. 3 neutral, 0-10 pp.	12-14

Western Pennsylvania

144-155 vis., 10 p.t. bright stock	19.5
180 vis., 0 p.t. neutral	20.5

CRUDE-SCALE WAX
Mid-Continent

132-134 A.M.P.	4.75


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
0
1
2
3
F M A M J J A S O N D
1946
F M A M J J A S O N D
1947
F M A M J J A S O N D
1948
F M A M J J A S O N D
1949

In this trend chart refinery realisation is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

EQUIPMENT MEN . . . in the News

Lee C. Moore Export Office Located in New York

The export office of Lee C. Moore Corp., of Tulsa and Pittsburgh, is now located in Room 1225 Time and Life Building, 9 Rockefeller Plaza, New York 20, N. Y. G. I. Lynch is export manager.

Schulze Named Sales Manager of Waukesha

Waukesha Motor Co., Waukesha, Wis., has announced the appointment of Fred C. Schulze as sales manager. Schulze, who formerly was assistant sales manager, joined Waukesha Motor Co. in 1928. He was active in various departments, including purchasing and plant engineering, before joining the sales department.

Southern Geophysical Makes Shivers Party Chief

G. C. Shivers, Jr., has been appointed a party chief of Southern Geophysical Co., Fort Worth, Dr. Sidon Harris, president of Southern, has announced. Shivers attended Mississippi College in Clinton and received a bachelor of science degree in 1946, majoring in mathematics and accounting.

He entered geophysical work in July 1946 with Western Geophysical Co. as a computer and worked in Louisiana, Mississippi, Georgia, Tennessee, Kentucky, Ohio, New York, and the Rocky Mountain area.

Hercules Opens Sales and Service Branch at Odessa

Hercules Motors Corp., Canton, Ohio, has opened a new factory sales and service branch in Odessa, Tex. A complete stock of power units and Hercules engine parts will be maintained at the Odessa branch. The new outlet augments the factory branches and retail stores already in operation at Los Angeles, Salem, Ill., Houston, and Kilgore, Tex.

Detroit Diesel Sends Scanlan to California

Appointment of Eward J. Scanlan as California zone sales representative for Detroit Diesel Engine division, General Motors Corp., has been announced by V. C. Genn, general sales manager. Scanlan will direct General Motors series 71 industrial and marine diesel engine sales through Detroit Diesel's distributor-dealer organization.

Territory covered in the assignment includes the entire states of California, Arizona, and Nevada. Prior to joining the division's sales staff, Scanlan served as diesel sales manager with the General Motors industrial diesel engine distributor in the State of Iowa. He will establish headquarters in the vicinity of San Francisco.

New Reed Plant at Corpus Christi

The new and modern plant building shown here is the recently opened Reed Roller Bit Co. plant at Corpus Christi, Tex. J. M. Jones, district manager for Reed, is in charge of the plant and A. G. Chandler is the division manager of the Corpus Christi area

Vinson Supply Moves Chilcoat to Tulsa

Jess Chilcoat has just been moved to the Tulsa office of Vinson Supply Co. and will devote his time to contacting the major companies and principal customers of Fisher controls and the other Vinson lines. Chilcoat is a graduate mechanical engineer from Texas University. He was formerly steam engineer and process engineer for Freeport Sulphur Co. at Freeport, Tex.

After his discharge from the Army, he spent a year with Fisher Governor Co., in Marshalltown, Iowa, in the engineering and sales departments. Later he joined Vinson Supply Co., in its Odessa store, spending the last year and a half in sales work.

I. H. Names Three to Head District Industrial Sales

Appointment of assistant managers in charge of sales of industrial wheel and crawler tractors, engines, and power units at three district offices of International Harvester Co., has been announced by J. D. Gladden, industrial manager of the southern region.

The new assistant district managers will be responsible for sales of the line of the company's industrial power division products through its distributors, and of engines and power units through other dealer outlets in their territories.

J. Frank McCoy, who has been supervisor of sales promotion at the district office in Parkersburg, W. Va., is now assistant manager there. He has been associated with International Harvester for 14 years and served as sales representative and zone manager before being named promotion supervisor in 1946.

G. W. Lassiter, who has been general line salesman, zone manager, and most recently, sales promotion supervisor for the Cincinnati district, is promoted to assistant district manager, Nashville, Tenn.

M. S. Burdette was named assistant manager, New Orleans, La. Previously, he was sales-promotion supervisor at Nashville and New Orleans, and earlier, general line salesman and district zone manager.

Rockwell Names Bush As Special Representative

R. R. BUSH

Roy R. Bush has been appointed special representative for the Nordstrom Valve Division of Rockwell Manufacturing Co. In making this announcement, A. J. Kerr, vice president of sales stated that Bush's activities would be national in scope and, aside from aiding the regular sales force on major projects, he would work with customer personnel on methods and routines of maintaining and servicing Rockwell products.

Bush joined the company's sales staff in July 1934 and has been assigned to Tulsa district office ever since. He was previously employed by Texas Pipe Line Co. in West Texas and also has a background of experience gained on drilling rigs in the Mid-Continent area where he worked as a tool dresser and roughneck. He attended Oklahoma University.

New Building Completed By McCullough at Bakersfield

McCullough Tool Co., Los Angeles, a manufacturing, engineering, and oil-well-tool service company has announced the completion and opening of its new building on Rosedale Highway and Mohawk Road, Bakersfield, Calif. This is the third move for McCullough in Bakersfield. The first office and shop was opened at 21st Street and Union Avenue in 1938. In 1943 additional space was required necessitating a move to larger quarters at the corner of California and Union avenues, where the Bakersfield headquarters remained until today.

Hufnagel Made Manager Of Koch Kaskade Tray

John (Jack) Hufnagel has been appointed manager of the Kaskade tray division of Koch Engineering Co., Wichita, Kans. He was formerly with Hydrocarbon Research, New York City. It has become necessary to expand the sales, engineering, and manufacturing divisions of the Koch Engineering Co., Harry Litwin, vice president, said in announcing the appointment.

Perry Kilsby Inc., 3311 East Slauson, Los Angeles, Calif., has also been appointed Pacific Coast representatives for Koch Kaskade fractionating tray. *(Continued on page 201)*

New Members, Guest Speakers, and Foreign Guests, Los Angeles Nomads

Guest speakers at the May meeting of Los Angeles Nomads were Lt. Gen. Ira Eaker, Hughes Aircraft Co., Culver City, Calif., and W. H. Sargent, Sargent Engineering Co.

New members, inducted at the May meeting, Los Angeles Nomads, are: L. T. Ratliff, Mid-Continent Supply Co., Los Angeles; W. H. (Bill) Sargent, Sargent Engineering Co., Huntington Park, Calif.; and R. L. Gollum, International Cementers, Inc., Long Beach, Calif. New member not in picture is James Whitaker, Christianson Diamond Products, Salt Lake City, Utah

A total of 123 members and domestic and foreign guests were present at the May meeting of the Los Angeles Chapter of Nomads. Foreign guests in attendance were: Above, standing, Paul Molidor, Standard Oil, Colombia; J. R. Grove, Nathsingh Oil Co., Ltd., Burma; A. L. Owen, Iraq Petroleum Co., Kirkuk, Iraq; A. T. Gano, Creole Petroleum Corp., Caracas, Venezuela; A. J. Dodini, Bahrein Petroleum Co., Ltd., Bahrein. Seated, C. H. Vincent, British Malayan Petroleum Co., Seria, Borneo; P. F. Owings, Iraq Petroleum Co., Kirkuk; and G. H. Atkins, Creole Petroleum Corp., Caracas. Picture at right, standing, M. R. Teague, Standard Oil, Egypt; D. E. McGehee, Standard Oil, Egypt; G. H. Patterson, Arabian American Oil Co., Dhahran, Arabia; and John H. Lewis, Drilling & Exploration Co., Inc. Seated, Mike H. Bush, Richmond Exploration Co., Venezuela; J. S. Ramirez, American Overseas Petroleum Co.; and R. B. (Bob) Loughboro, Aramco, Dhahran

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR SALE, near Borger, Texas: 1320′ of 7″, 20#, No. 1 grade lapweld casing; 1700′ of 6⅝″, 28# smls casing made from drill pipe; 4000′ of ⅝″ sucker rods with Huber paraffin scrapers already applied. Will buy 2000′ of 6⅝″ drill pipe to cut up into casing. The Clay Brothers Drilling Co., Inc., 918 W. T. Waggoner Bldg., Fort Worth 2, Texas, or Service Drilling Co., Kennedy Building, Tulsa, Oklahoma.

ONE Army surplus Buda M. O. 893, six cylinder engine with skid complete, $1,750.00 F.O.B. Houston. W. H. Orr, A 8-6064; #15 Japhet Street, Houston 10, Texas.

USED 2-Drum CARDWELL MOBILHOIST, $7800.00. Can be used as well service winch; also with cable tools; also has rotary drive sprocket. R. F. HARE, Box 175, Phone 223, Ozona, Texas.

OIL WELL CASING: Have good used lapweld, 7″ and 8″ sizes. C. M. BARRINGTON, Phone 4915, Coleman, Texas, Box 831.

DRILLING EQUIPMENT FOR SALE
Cable tools, steel rig with timbers, flooring, belt house, three Ford engines, fishing tools, lines, complete set drilling tools. About 475 feet 15½ inch seamless casing, about 75 feet 20 inch. Reference, American Supply Co., Falls City. Fred E. Bodie, Room 504 Barkley Building, Lincoln 8, Neb.

TANKS—TANK CARS
NEW LOW PRICES

2—74,000 Bbl. Steel Tanks, Like New
2—10,000, 3—1,000 and 3—65 Bbl. API New Bolted Tanks
80—8,000 and 10,000 Gal. Cap. Tank Cars

THE DARIEN CORPORATION
60 E. 42nd St. New York 17, N. Y.

FLAT MILD STEEL PLATE

80 pcs.—⅜″ x 60″ x 180″
80 pcs.—¼″ x 60″ x 180″
275 pcs.—⅛″ x 60″ x 180″
245 pcs. 3/16″ x 60″ x 180″
300 pcs. 5/16″ x 60″ x 180″
150 pcs.—½″ x 60″ x 180″

Above ring plates available dismantled 55,000 barrel tanks, used good condition.

Priced low for quick delivery from Seminole, Okla., district.

HORWITZ PIPE & STEEL CO.
Ph. 2-9128 Tulsa, Okla.

EQUIPMENT FOR SALE

FOR SALE: Model "K" Cardwell, single drum draw works powered by G.A.K. Waukesha engine. Equipped with 90′ "A" mast and sub skid. Priced for quick sale. Terms. Melton Supply Co., Seminole, Okla.

FOR SALE: 30′x40′x12′ Stefco Sectional Steel Corrugated Iron Boiler House. Erected in the Seminole Field. $850.00. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: Rotary Mast Pole. 1—8″ x 10″ x 87′ Two Leg Mast Pole with 5—24″ Roller bearing sheaves, in crown. 90′—¾″ Raising Line and 110′—½″ Telescope line. 1200′—9/16″ Guywires and 160′—⅞″ Guywire. 1—4000′ Double Board, 1—30′ Main Skid with upright supports for Mast and well for Rotary table. Denman Drilling Company, Phone 4553, Wichita Falls, Texas.

ROTARY equipment, almost new, only used few days, 1800′ PK rods, Drill collar 30′x4¼″ with 3½″ box, King water swivel 1¼″, PK slips, hoisting plugs, overshot. Complete outfit $4500, or will divide. We handle new and used spudders, rotaries, core drills, pipe, tools, cable. Fishing tools and equipment rented. Pressey & Son, Pueblo, Colo.

BUCYRUS-ERIE 36L Spudder—A-1 condition. Will sell with or without complete set of tools, including complete set of casing tools. L. H. Bebout, Route 3, Newark, Ohio.

PRACTICALLY NEW

Magowan Duplex Steam Pumps, Ball Valve, Brass fitted, each with mechanical lubrication.

1—10 x 7 x 10 2—10 x 12 x 12
2—10 x 8½ x 10 1—14 x 12 x 12

CONSOLIDATED PRODUCTS CO., Inc.
17-20 Park Row New York 7, N. Y.
Phone—BArclay 7-0600

FOR SALE

Practically New Bethlehem S-40 Pulling Unit complete with all equipment, powered with 145-GKU Waukesha Engine—Bargain.

C. L. McMAHON, INC.
1605 National Bank of Tulsa Bldg.
Tulsa, Oklahoma

NEW
FRACTIONATING TOWER
REFLUX DRUM

One (1) New fractionating tower, 5′-0″ I.D. X 89′-6″ over-all height X 1⅛″ plate. Thirty-four (34) bubble trays, ten (10) 18″-300# manways. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

One (1) new horizontal reflux drum, 5′-6″ I.D. x 18′-6″ over-all length x 1⅛″ plate. Stress relieved and built in accordance with API-ASME Code for 350 PSI working pressure.

ROCK ISLAND OIL & REFINING CO., INC.
335 West Lewis St. Wichita, Kansas
Phone 7-3325

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

SAVE WITH SAFETY—Very Good Used Wire Line—Any Size or Length up to 5,000′—Respooled for Your Inspection — Cable Tools for Sale. General Tool & Supply Co., P.O. Box 4387, Phone 61335, Oklahoma City, Okla.

FOR SALE—Franks Model FA with automatic chuck, complete with watertruck and all equipment. Mounted on late 2-ton trucks. Due to other interest will sell very reasonable. Box C-913, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 10,000 ft. 20″ OD x ¼″ Wall New Electric Weld Steel Pipe, Double Random Lengths; 50,000 ft. 18″ OD x ⅜″ Wall Used Steel Pipe, Single Random Lengths. Utility & Industrial Supply Company, 921 Michigan Ave., E., Jackson, Michigan.

COMPRESSOR BARGAIN: 14″ and 16″ Ingersoll Rand and Worthington Duplexes. All in excellent mechanical condition. 5½″ to 16″ bore cylinders available. Traders Oil Company of Houston, 821 Esperson Building, Houston 2, Texas.

FOR SALE: Wilson Super Spudder—Double drum, double pole mast, complete with walk ways, roof, wings, and fully skidded—Good Wire—Priced to sell. Wilson Mogul Drawworks, powered by 145 GK Waukesha—Portable derrick—Wilson Snyder 6 x 16 pump, powered by WAK Waukesha—4½″ Drill Pipe, Traveling Block, Swivel, 4¼″ x 40′ Kelly, BJ Tongs, etc.—Priced to sell. Write: T & R Oil Field Machine & Supply Co., Box 98, Carmi, Ill.

STEEL PIPE

1300 ft.—5½″ with couplings
Located Chicago.
Invite rigid inspection

DONALD B. MAC NEAL, Inc.
12100 S. Loomis St. Chicago 43, Ill.
Pullman 5-3411

FOR SALE

3 Superior natural gas generating units complete with conical generating panels. All of latest type and design. All 3-phase, 60 cycle, 480 volts, and with the following ratings:

1—685 Horsepower, 480 KW, 327 RPM.
1—510 Horsepower, 350 KW, 400 RPM.
1—365 Horsepower, 225 KW, 400 RPM.

K & L CONSTRUCTION & SUPPLY CO.
434 Mayo Building Phone 5-5639
Tulsa, Oklahoma

STEEL STORAGE TANKS

6—55,000 BBL.
2—18,000 BBL.
1—17,500 BBL.
4—5,000 BBL.

All dismantled suitable re-erection. Detailed specs. available. Priced low for prompt removal present locations Oklahoma, Kansas and Texas.

HORWITZ PIPE & STEEL CO.
Ph. 2-9128 Tulsa, Okla.

FOR SALE
NEW CASING AND LINE PIPE

25,000′ 5½″ 15½# 8RT J55 R2 API Smls. Casing
15,000′ 7″ 23# 8RT J55 R2 API Smls. Casing
6,000′ 8⅝″ 28# 8RT J55 R2 API Smls. Casing
4,641′ 9⅝″ 36# 8RT J55 R2 API Smls. Casing
7,015′ 10¾″ 40½# 8RT J55 R2 API Smls. Casing
19,000′ (893 Joints) 6″ Std. Byer's Wrought Iron L.W. Plain End Pipe (ASTM A72-33)

Above subject to prior sale.

THE NATIONAL COOPERATIVE REFINERY ASSOCIATION
P.O. Box 770 McPherson, Kansas
Phone 820

EQUIPMENT FOR SALE

1—Worthington horizontal duplex reciprocating pump, enclosed frame, outside end packed plungers, forged steel fluid end, water cooled stuffing boxes, stainless steel valves and seats, size 10x3x10. 1—Clark engine and compressor, engine 80 H.P., size 16" x 15" x 7¼" x 20", 200 R.P.M., compressor intake pressure 0 lbs. discharge pressure 350 lbs., type Q compressor cylinders. 1—Worthington 4" x 18", 4-6 chrome block, horizontal, duplex, double plunger, enclosed frame hot oil fitted power pump, driven by Worthington 12½" x 14" horizontal, double acting steam engine with some spare parts for engine. 1—Worthington 5¼" x 18", 4-6 chrome block, horizontal, duplex, double plunger, enclosed frame, hot oil fitted power pump with some spare parts, driven by Worthington 12½" x 14" horizontal, double acting steam engine with some spare parts. Equipment second hand, in good condition; spare parts new. American Liberty Oil Company, Mt. Pleasant, Texas.

FOR SALE: Wilson Mogul Draw Works, Waukesha GKU 145 engine, American Simplomatic breakout cathead, butane equipped. Used about one year. Excellent condition. Box C-951, The Oil and Gas Journal, Tulsa, Oklahoma.

IMMEDIATE shipment two 500 hp. 1000 rpm. Winton GM diesels. Four 330-400 hp. 1800-2000 rpm. new GM twin diesels. Two 165-200 hp. 1800-2000 rpm. new GM single diesels. One 12 KW Superior diesel generator 115v DC. Holliday Motors, Indianapolis 7, Indiana.

MANUFACTURERS LATEST DESIGN

Hydraulic Casing Pulling Units. Complete line of equipment. Units made to your specifications. Truck Mountings or Skid Units. Repair Service and Parts.

OKLAHOMA MACHINE & SUPPLY CO.
Ada, Oklahoma

PACKAGED H_2S REMOVAL UNITS

We offer prompt shipment on skid-mounted hydrogen sulfide removal units for treating sour gas for pipe line or fuel gas purposes.

GRAFF ENGINEERING & EQ'PT. CO.
3415 Westminster, Dallas 5, Texas

STEEL STORAGE TANKS

Railroad Tank Car Tanks
6,500 to 12,000-Gal. Cap.
Coiled and Non-Coiled
Cleaned—Painted—Tested
Heavier—Safer—Cheaper
Other Tanks Too
Also—Complete Tank Cars
8,000 and 10,000-Gal. Cap.

Your Inquiries Solicited

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Phone: COrtlandt 7-8090

COMPLETELY EQUIPPED

NEW HERCULES RXC

Gasoline Engines

Price of engines, with full equipment, is $1250 . . . . less than usual cost of engine alone! PROMPT SERVICE IS ASSURED THROUGH NATIONAL FIELD ORGANIZATION.

Engine rating, 110 H.P. at 1800 r.p.m. Equipment includes: cast iron radiator; starter; Twin Disc clutch power take-off; heavy metal housing; all power controls; etc.

Wire or write
Box C-945, The Oil and Gas Journal, Tulsa, Oklahoma

EQUIPMENT FOR SALE

COMPLETE GENERATING PLANT
Two NT 128-BHP vertical natural gas engines and one 48-BHP, driving two GE 75-KW, 3-phase, 4-wire 120/208 volt, 60-cycle generators and one 30-KW, 3-phase generator respectively. Complete with switchboards and auxiliary equipment. Running and in good condition. Public Market, 311 So. Klein, Okla. City, Okla.

FOR SALE: Wilson Giant draw works, powered by 2—J.L.-1335 Buda engines and Wilson chain compound. Like new condition, with bargain price. Terms. Melton Supply Co., Seminole, Okla.

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

Several Army Surplus 4½" x 6" Gaso Duplex 1800 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

6" STD. LINE PIPE

42,500' 6⅝" O.D., 18.97# Lapweld, 40 ft. random lengths, plain ends beveled, used, good condition. Priced low, immediate delivery from East St. Louis, Ill.

HORWITZ PIPE & STEEL CO.
Ph. 2-9128 Tulsa, Okla.

FOR SALE

10 Sterling Viking engines. Can supply generators. These engines suitable for generator or pump drives of following ratings for continuous service:

RPM	HP	KW
600	190	125
720	225	150
900	285	190

K & L CONSTRUCTION & SUPPLY CO.
434 Mayo Building Phone 5-5639
Tulsa, Oklahoma

FOR SALE

Gas Engines

6—500 B.H.P., 125 RPM, 21½" x 36" Single Tandem, Cooper Gas Engines
2—50 B.H.P., 250 RPM, 13" x 16" Single Acting, Cooper Gas Engines
7—75 B.H.P., 268 RPM, 13½" x 16" Single Acting, Cooper Gas Engines
11—160 B.H.P., 190 RPM, Type 75, Twin, Cooper Gas Engines
3—60 B.H.P., 300 RPM, 9½" x 11" Reeves Gas Engines
2—50 B.H.P., 250 RPM, 13" x 16" Single Acting, Cooper Gas Engines (Belted Type)

Compressors

2—13½" x 36" Cooper Compressors
2—13¾" x 36" Cooper Compressors
1—14" x 36" Snow Compressor
1—16" x 36" Cooper Compressor
7—6½" x 20" Cooper Compressors
14—5½" x 20" Cooper Compressors
6—7" x 20" Cooper Compressors
2—10⅛" x 20" Cooper Compressors
1—10½" x 20" Worthington Compressor
7—8" x 20" Cooper Compressors
3—11½" x 20" Cooper Compressors
2—12" x 6" x 16" Cooper Compressors

Generators

2—40 KW, DC, 125V 320 AMP, General Electric Generators
2—40 KW, DC, 125V 320 AMP, Allis-Chalmers Generators

THE OHIO FUEL GAS COMPANY
99 N. Front St., Columbus, Ohio
R. A. Bacon, Manager of Purchasing

EQUIPMENT FOR SALE

CASING, A-1 used lapweld, T C.V threads, 5½, 13 lb. 60c; 7 in. OD. 17 lb., 70c; same size 20 lb. 82c; 8⅝, 24 lb., $1.28; tubing, 2⅜, 4.50 wt. T C, 11½ V thread, regular or upset, 22c, subject inspection, on cars central West Va. Two only 165 HP Waukesha drilling motors, gas-gasoline, like new, $2750, 25 strings cable tools, bits, bailers, fishing tools, rigs, drilling machines. H. P. McGinnis, Box 827, Parkersburg, West Va.

FOR SALE: Double drum heavy duty spudder, 6500 foot capacity, with telescoping mast with roller bearing sheaves, all mounted on steel skid. All tools for 7" and 5" casing, Kohler light plant, unitized forge on skid, large skid rack for moving all tools. Machine and tools in excellent shape. Everything rigged for quick moving. Ready to put to work. Price $12,500.00. Box C-857, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT WANTED

WANTED: 4 miles each 6" O.D. and 4" O.D. invasion pipe; also desire victaulic couplings. Box C-938, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

WANTED: Experienced oil field equipment salesman with practical experience background on spudders and cable tools for sales position with nationally known oil field equipment manufacturer. Box C-904, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Graduate engineer for supervisory work in pipe line construction, operation and maintenance. Location — Texas Gulf Coast. Prefer M.E., P.E. or C.E., 25 to 30 years old with three years experience or more in pipe line or related oil field work. In replying give full details including education, experience, references and personal details. Box C-958, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men: Salaried positions—$3600 to $20,000. This confidential service for outstanding men who desire a change of connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

WANTED

EXPERIENCED PETROLEUM ENGINEER

Specializing in study of OIL and GAS RESERVES. To head reserve section large independent oil company. Location, Tulsa, Oklahoma. Give full particulars as to personal history, academic qualifications, practical experience, references, and salary expected. All communications confidential.

Box C-933, The Oil and Gas Journal, Tulsa, Oklahoma

ENGINEERING

During the next several months we will increase our Engineering Organization engaged in the design of Oil Refinery Plants and Power Plants. Location Cleveland, Ohio. The men we need should be qualified as draftsmen, designers, checkers or in higher engineering skills on design of piping, instrumentation, pressure vessels, structural steel, concrete, mechanical or electrical. For presenting your qualifications and prompt consideration, write to us for application form.

ARTHUR G. McKEE & CO.
2300 Chester Ave., Cleveland 1, Ohio

HELP WANTED

NEW foreign and domestic Oil Employment Directory. Over 500 listings in drilling, production, refining, natural gasoline, pipelines, geological, exploration, supplies, manufacturers, services; and trucking, refinery and pipeline contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (Our 29th Year).

GEOLOGIST: Small producing Company needs young man with a degree and 3 to 5 years experience in the Illinois basin for exploration on a salary basis. Give complete personal information and salary required. Box C-952, The Oil and Gas Journal, Tulsa, Oklahoma.

WAX SALES EXECUTIVE

Nationally prominent petroleum company can offer an exceptional opportunity to a top-flight technical sales executive who by education and experience is qualified to direct the marketing of large quantities of wax in all channels of sale.
Applicants should write, giving complete information regarding background, education, experience, and compensation desired, first letter. Reply to

Box C-943, The Oil and Gas Journal, Tulsa, Oklahoma

SITUATIONS WANTED

REFINERY MANAGER: M. S. in Ch. E., age 35, registered Texas engineer, thorough knowledge refining, now manager small Texas refinery. Desire new connection. Available short notice. Box C-930, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN with several years oil refinery experience desires similar position with independent refinery. Box C-953, The Oil and Gas Journal, Tulsa, Oklahoma.

CIVIL ENGINEER and Secretary, Husband and Wife, Age 33 and 34. Both 13 years' experience. Engineering experience in cost estimating and material takeoff, plant layout, gasoline and gas pipe line design and construction and all types of river construction. Excellent secretary, office administration, engineering, oil, some legal. Prefer Midwest or would consider foreign. Write Box C-954, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN with several years oil refinery management experience desires position as district sales representative for refinery supplies. Box C-955, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER Seismograph Party Chief would like broader knowledge of oil industry. Desire connection with established operator, geologist, or small production company. Geological degree. Details on request. Box C-956, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL ENGINEER—Age 37, married, with 15 years experience in design, development and construction, desires permanent employment with security and advancement possibilities. Require 15-day notice for present employer. Resumé furnished on request. Reply Box C-957, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVES ATTENTION: If you need a man of excellent legal background with broad land, exploration and production experience write Box C-936, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN: Diversified experience in Gulf Coast, West Texas, Rockies and Canada. Legal background. Box C-937, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER: B.S. in Petroleum Engr. 5 years varied refinery and gasoline plant experience including laboratory, drafting, construction, process design, specification writing. Registered Oklahoma Engineer. Box C-948, The Oil and Gas Journal, Tulsa, Oklahoma.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

ROYALTIES IN HOT AREAS!
Recent strikes have focused attention on Montana's deeper oil zones and major companies are moving fast, drilling and leasing. We buy direct in the field, sell direct to our customers. Write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Montana.

CASH MARKET FOR PRODUCING ROYALTIES
ROBERT L. KINKAID
World Bldg. Tulsa, Oklahoma

WE will buy producing or non-producing oil royalties. Standard Security Company, 115 Broadway, New York 6.

LEASE AND DRILLING BLOCKS

FOR SALE: Oil lease 200 acres, S½ of SW¼ Sec. 21, N½ of NW¼, SE¼ of NW¼ Sec. 28. All in T-29N, R 14E, Nowata County, Okla. 3 wells Bartlesville sand 1240' 20' of pay. Present production 10 bbls. per day net. Full particulars, M. J. Regan, Coffeyville, Kans.

I HAVE $200,000 worth of new California residential income property. Will trade in on settled production anywhere in U. S. May add cash if the deal is right. N. G. Snyder, 434 South Irving Blvd., Los Angeles 5, Calif.

OIL LEASES for sale in large, small or medium size blocks in Colorado, Wyoming, New Mexico, Montana, Arizona. Wholesale or retail. Write for descriptive list. Dyer-OJ, 1835 Champa, Denver, Colorado.

FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky. W. P. Harley, Bowling Green, Ky.

FOR LEASE for oil and gas—acreage in Brazoria County near Angleton, Texas. Write E. Hufford, Box 633, Boulder City, Nevada.

PROVEN and semi-proven shallow leases to let on farm out basis. Sands from 500 to 1,900 feet. W. H. Mahon, Brownwood, Texas.

FOR SALE: SHALLOW production in Southeast Kansas. 30 bbl. per day, never water flooded, also gas production sufficient for nearby town with 260 customers. Gas franchise just renewed for 20 years. Above production and franchise for sale. Good water-flood prospects. Box C-944, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES ROYALTIES

PRODUCING OR NONPRODUCING

Texas, New Mexico, Oklahoma, Louisiana and Illinois

Inquiries Invited

B. D. BUCKLEY

60 Broadview Drive, Clayton (5), St. Louis, Missouri

Have drilling blocks and semi-proven leases in Central and North Central Texas for drilling. Wish to contact party who is financially ale and really interested in drilling for an interest. All have shooting pictures or good geology. Nothing deeper than 4,000 ft. No brokers, please. Principals only.

BOX C-950

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

WILL furnish free to reliable operator or drilling contractor genuine Clairvoyant oil locations in Montgomery County, Miss. On Magnetometer and Seismograph Highs and $5,000.00 towards drilling 3,500 ft. well. Gushers, 1369 Court, Memphis, Tenn.

SOUTHEASTERN NEW MEXICO: For Sale—Oil leases and royalties in North Lea and Eastern Chaves Counties. Grant Keyes, 311 White Bldg., Roswell, New Mexico.

WE BUY Salvage Oil Properties and small production. Ben H. Rosenthal, 1901 Republic Bank Bldg., Dallas, Texas.

We are offering for sale 45 barrel gross daily production water flood project in Elk County, Kansas. 33 gravity. Complete details available. Cities Service Oil Company, attention H. D. Patridge, Bartlesville, Oklahoma.

NEW MEXICO OIL

Sub-surface map covering Major Structure Chaves County, NW of Cross Roads field. Structural control and Major Co. support indicates another large potential field. Rig erected to drill 6000' cutting all oil zones and Upper Pennsylvania. Maps & lease data on request. We specialize in areas under Major Co. operation.

W. J. PETERMAN, GEOLOGIST
Portales, New Mexico

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BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

SERVICES

PECOS DRILLING COMPANY, INC.
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302 CARPER BUILDING, TELEPHONE 649
ARTESIA, NEW MEXICO

RADAR SURVEYS made with latest mobile radar equipment installed in Jeep Truck and modified for oil exploration. Locates and outlines areas of possible oil saturation. Defines faults. For further information write Geotronic Surveys, 335 So. Sycamore St., Centralia, Illinois.

FOR SALE

WILL sell ¼ interest in high grade mica mine in U.S.A., covering 50 acres, for $10,000. Core drilled, excellent report by Bureau of Mines. W. K., 1602 Noble Street, Houston, Texas.

ALUMINUM PAINT—400 5-gallon cans, 480 quarts—Exterior Gilsonite Base, Highly Polished Pure Aluminum Pigment. Waterproof, ideal for tanks, roofs, buildings, equipment. Covers 300 to 400 square feet to the gallon. Distributors Liquidation. Regular price $6.95 gallon. Take any part—$10.00 for 5 gallons, $7 for 12 quarts. Send Check With Order. The National, 606 Walnut, Kansas City, Mo.

FOR SALE OR CHARTER

Boat 65 ft. by 18 ft.; 165 G.M. Diesel; wood; rigged nicely for geophysical exploration work; approximately 1,000 gallons fresh water; Koehler electric plants; refrigerator and deep freezer; innerspring mattresses; awning over working area aft. Vessel and equipment slightly over a year old. Worked since completion as survey boat for oil company engaged in geophysical exploration work in Gulf.

Also other boat suitable for offshore exploration work.

H. P. McHUGH
Morgan City, Louisiana

EQUIPMENT MEN

(Continued from page 197)

Tommy Johnston Stationed In Permian Basin Area

Tommy Johnston, general service manager of M. O. Johnston Oil Field Service Corp., Los Angeles, is currently stationed at Odessa, where he is assisting Johnston Oil Field Service of Houston in field operations. In a move to expand services in this fast-developing oil territory, the Johnston Texas company recently purchased the stores at Andrews, Kermit, Midland, Odessa, San Angelo, and Snyder, Tex., and Hobbs, N. M., from the Johnston California Co.

Johnston has been temporarily assigned to the Johnston Houston Company because of his years of experience in the Permian basin with Johnston formation testers and Shoot-N-Test gun perforators. When this mission is completed, he will return to his Los Angeles headquarters to direct M. O. Johnston field activities in California, the Rocky Mountains, and Canada.

A. D. MacLean Made Chief Engineer of Chaplin-Fulton

Allen D. MacLean has become chief engineer of Chaplin-Fulton Manufacturing Co., manufacturers of valves and pressure regulators. His previous connection was with H. K. Porter Co., in charge of the pump division and more recently of the valve division of that company, with headquarters in Pittsburgh.

For 20 years, up to 1945, he was with the Pittsburgh Equitable Meter Co., advancing to the position of vice president and chief engineer. A still earlier connection was with the New Departure Manufacturing Co., a division of General Motors Corp., in research, testing, and design development of tools, gages, and fixtures.

Franklin Made Distributor For Bethlehem Equipment

At the annual meeting of the shareholders and directors, Franklin Supply Co. announced that it had recently been appointed as distributor for Bethlehem pumping units and rotary equipment. Acquisition of the Bethlehem line will enable Franklin to meet the complete equipment requirements of the production and drilling branches of the industry.

Larry Harper, Franklin vice president in charge of the Mid-Continent area, headquartered in Tulsa, said that the products to be handled by Franklin for Bethlehem include pumping units and rotary drilling equipment.

The company announced the re-election of the following officers: Jene Harper, president; Stanley Martin, executive vice president; L. H. Strouse, vice president; Roy Wood, vice president; Jean Harper, secretary; and Al Mitchell, treasurer.

Franklin also announced the establishment of a new yard and storage facilities at Mears, Mich., which will serve western Michigan producers.

Clark Brothers Promote Van Campen, McDonald

A. G. VAN CAMPEN

R. C. McDONALD

Clark Brothers Co., Inc., has announced the promotion of A. G. Van Campen to district manager of the Chicago office, and R. C. McDonald to sales engineer in the New York office, to succeed Van Campen.

Van Campen joined Clark Brothers' experimental engineering department in 1936 after attending Yale University. Later promotions took him through technical service, sales engineering, and engineering departments In 1945 Van Campen was transferred to the New York office as district engineer, and in 1947 he was promoted to sales engineer. A. R. Hauser, who has been representing Clark Brothers and Pacific Pumps, Inc., in the Chicago area, will devote all of his time to Pacific Pumps in the future.

McDonald was transferred to his new position from Pacific Pumps, where he also served as sales engineer in the New York area. After graduating from Northeastern University in 1939, he attended a Worthington student training course and in 1940 was assigned to the centrifugal pump application division.

Clark Brothers also have announced that T. P. Latimer has joined their turbo-machinery sales division. Latimer joined Clark Brothers immediately upon graduation as a mechanical engineer from Cornell University. He will be located at Olean, N. Y.

Misson Named President Of Walter Motor Truck

Following the recent death of L. G. Stelzle, former president, Walter Motor Truck Co., Queens, L.I., N. Y., has announced several new appointments. Clinton A. Misson has been named president and director, while Maurice Walter continues as vice president and has been elected chairman of the board of directors.

Misson graduated from the U. S. Naval Academy in 1921 and finished postgraduate work in Carnegie Institute of Technology.

Walter, son of the originator of Walter Trucks, has been associated with the company for 30 years, acting in capacities of chief engineer and vice president.

Nielsen Made Tulsa Sales Engineer for Dowell

Emery H. Nielsen, former service engineer with Dowell Incorporated in Great Bend, Kans., has been made general sales engineer in Tulsa. Nielsen replaces Herb A. Koch, who was recently transferred to Fort Worth.

Nielsen came to Dowell in 1944 after having several years experience in the oil fields. He is a graduate mechanical engineer from University of Oklahoma.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington, 25, D.C. Notice is hereby given that the lands listed herein are offered through sealed bids on the terms hereinafter specified, to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the lands under sec. 17 of the Leasing Act of February 25, 1920 (41 Stat. 437; 30 U.S.C. sec. 181), as amended. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D. C., on or before 1 p.m. of the date set out herein. Each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank or by money order made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.42 (b) and (c). The envelopes should be plainly marked that they are not to be opened before the date and hour set out herein, and should show the number of the parcel and the name of the field. No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental must be paid and an acceptable surety bond in the sum of at least double the amount of rental, but in no case less than $1,000 nor more than $5,000, must be furnished by a successful bidder prior to the issuance of a lease. An acceptable $5,000 surety bond will be required prior to commencing drilling operations on the land. The deposits of the other bidders will be returned upon acceptance of the successful bids. Bidders are warned against violation of section 59, U.S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Royalties payable to the United States will be at the rate of 12½ per cent to 25 per cent for oil, and 12½ per cent to 16⅔ per cent for gas, in accordance with Schedule B in the lease form. Annual rental will be at the rate of $1.00 per acre. The land is offered in one parcel described as the W½ sec. 35, T. 30 N., R. 113 W., 6th P.M., Wyoming, 320 acres, within the known geologic structure of the Big Piney Field. Bids must be submitted on or before 1:00 P.M., Daylight Saving Time, June 29, 1949. Marion Clawson, Director.

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CALENDAR

June

American Society for Testing Materials, fifty-second annual meeting, Hotel Chalfonte Haddon Hall, Atlantic City, N. J., June 17-July 1.

Kentucky Oil & Gas Association, annual meeting, Hotel Lafayette, Hotel Phoenix, Lexington, Ky., June 23-24.

American Society for Testing Materials, fifty-second annual meeting, Chalfonte-Haddon Hall, Atlantic City, June 27-29.

American Society of Mechanical Engineers, semiannual meeting, University of California Extension Building, San Francisco, June 27-30.

August

United Nations Scientific Conference on the Conservation and Utilization of Resources, U. N. Interim Headquarters, Lake Success, N. Y., August 17-September 6.

September

Interstate Oil Compact Commission, summer quarterly meeting, Stanley Hotel, Estes Park, Colo., September 1-3.

Instrument Society of America, annual meeting and exhibit, Municipal Auditorium, St. Louis, September 12-16.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 14-16.

American Gas Association, annual convention, Chicago, September 17-20.

American Institute of Chemical Engineers, Mt. Royal Hotel, Montreal, September 18-20.

American Association of Oilwell Drilling Contractors, ninth annual meeting, Baker Hotel, Dallas, September 19-21.

National Butane-Propane Association, Jefferson Hotel, St. Louis, September 19-21.

Mid-Continent Oil and Gas Association, twenty-seventh annual convention, Louisiana-Arkansas division Roosevelt Hotel, New Orleans, September 22-23.

American Institute of Mining and Metallurgical Engineers, regional meeting, Neil House, Columbus, Ohio, September 25-28.

American Society of Mechanical Engineers, fall meeting, Erie, Pa., September 28-30.

October

American Society of Mechanical Engineers, petroleum division, 1949 Petroleum Mechanical Engineering Conference, Biltmore Hotel, Oklahoma City, October 2-5.

National Association of Corrosion Engineers, South-Central Regional Division, annual meeting, Adolphus Hotel, Dallas, October 3-4.

National Lubrication Grease Institute, Hotel Roosevelt, New Orleans, La., October 3-5.

American Institute of Mining & Metallurgical Engineers, Petroleum Branch, fall meeting, Plaza Hotel, San Antonio, October 5-7.

American Society for Testing Materials, first Pacific area national meeting, Hotel Fairmont, San Francisco, October 10.

Texas Mid-Continent Oil and Gas Association, annual meeting, Rice Hotel, Houston, October 13-14.

American Gas Association, annual convention, Chicago, October 17-20.

NOMADS

Houston Nomads, second Monday of each month, Ye Olde College Inn, Houston.

Los Angeles Nomads, second Wednesday each month, Jonathan Club.

Interior view of a 14'3" x 110' fractionating tower showing installation of one of the stainless steel bubble trays to complete another superior fabrication by Wyatt's for the Petroleum Industry.

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Hughes Seal Grip Tool Joints may be installed, removed, and replaced anywhere . . . designed for maximum strength, safety, and complete utility as to field replacement. A dependable seal at both ends of the seal grip thread provides:

1. Protection from corrosion for pipe and tool joints
2. Added strength resulting from longer engagement

The Seal Grip pipe end threads have shallow depth, coarse pitch, and steep taper. These features provide the following advantages:

1. Shallow depth threads permit the use of a minimum of the available section of pipe and tool joint for thread.
2. Coarse pitch threads are rugged and less susceptible to damage in installation and handling.
3. Steep taper permits a thicker tool joint section at the end of the pipe, providing a greater strength where the greatest loads occur.
4. Shallow depth, coarse pitch, and steep taper contribute to the reduction in the number of make-up turns required to assemble.

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